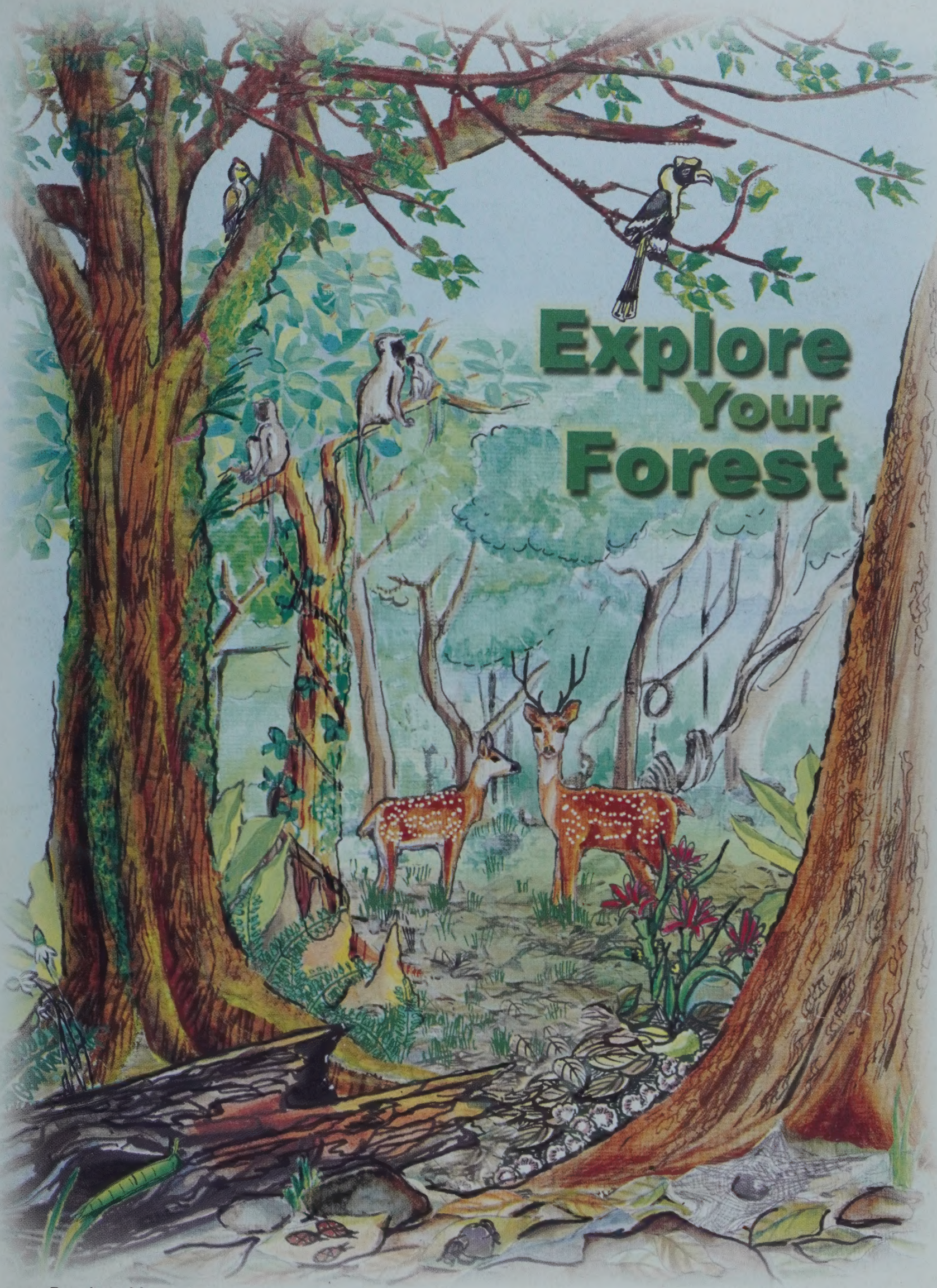

Explore Your Forest

Developed by

Bharati Vidyapeeth Institute of Environment Education and Reseach
Bharati Vidyapeeth, Deemed University, Pune 43

Funded by
World Wide Fund for Nature-India, New Delhi

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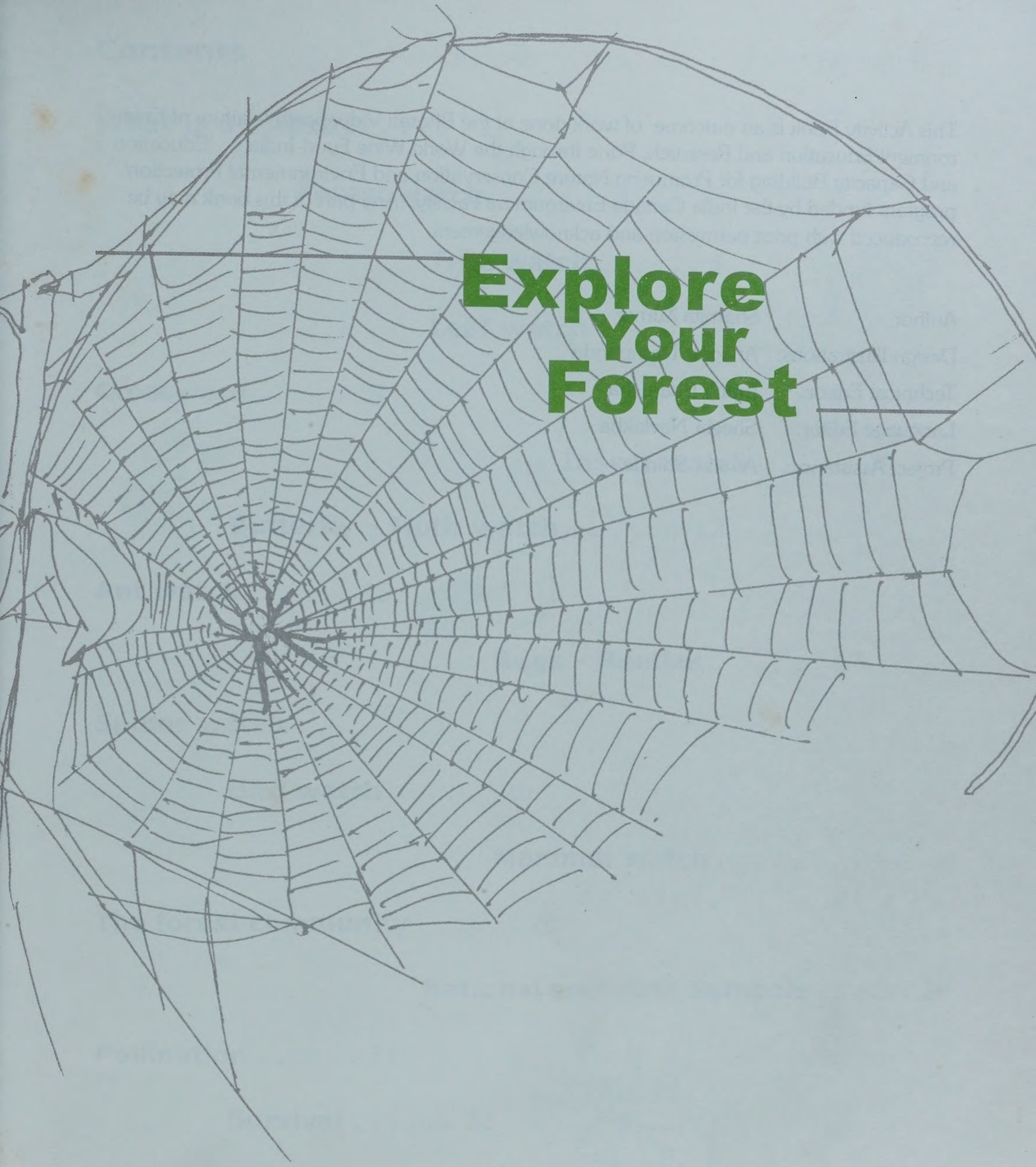

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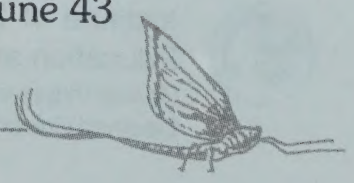

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Forest Watch.....

This book will tell you how much fun you can have exploring a forests' wonderful creatures and the way they live. Nature is all around us. How often have we stopped to watch and admire new leaves growing, a butterfly flitting from flower to flower or have listened to the chirping of the birds? You might have seen birds on trees in your garden or near your homes. They are different from the ones you see swimming in the water. This is because each of the birds and animals are adapted to live in a specific ecosystem.

India has a variety of different ecosystems. Natural ecosystems are forests, grasslands, deserts, rivers, lakes and seas around us. These ecosystems have their own different types of plants and animals and are dependent on factors such as geographical locations, climate, the amount of rainfall and the type of soil.

India is rated among the top fifteen nations of the world for its great diversity in plant and animal life. It is rich in flowering plants, insects, amphibians, reptiles, birds and mammal species. Many of these species are endemic to India, that is they are not found anywhere else in the world.

This Activity Book contains information about India's forests and the plants and animals found in our forests. It also has activities that will help you in exploring these forests and make your visit to a forest an enjoyable learning experience.

The basic skills needed for exploring Nature are very simple-enthusiasm, patience and adequate time.

There are a few essentials that one must carry as well as certain ground rules that one must follow to make your trip fun as well as a learning experience.

Wearing dull coloured clothes helps you to blend with the surroundings so that you are able to spot animals and birds without disturbing them.

Birdwatching needs binoculars. With a binocular one can appreciate the colours, shapes and other minute details of birds.

A 'field guide' – identification book for birds is also very helpful as the accuracy of your identification can be verified.

A good hand lens is a must for insect watchers as it helps you see features that cannot be seen with the naked eye.

You could also carry a transparent box with you for closer observation of insects.

No matter which aspects of Nature you are watching, noting and sketching what you see is very important. Also remember to note where and when you saw something.

Keep alert and take time to stop, look and listen to various things around you. Making loud or sudden noises or moving carelessly will disturb wildlife and reduce your chances of spotting them.

Don't forget to check the plants, especially beneath the leaves, under decaying logs or rocks for insects. Be sure to put it back the way it was.

Some species of snakes can be dangerous. Quitely move away from snakes. Most snakes are however non-poisonous.

These simple tips will help you explore your forests and understand this resource that provides man with so many goods and services. Conservation needs all of us. You can begin by understanding Nature.

What is a forest ?

When we think of forests, we think of trees.
However a forest ecosystem also has grasses, herbs, shrubs and climbers.
Some climbers are woody and are called lianas.
The plants in a forest could either be flowering (angiosperms)
or non-flowering (gymnosperms).
Some plants in the forest have aerial roots, fleshy leaves and grow
on other plants above the ground. These are called epiphytes.
Most of the orchids belong to this group.
Some plants draw their food resources from other plants.
These are called parasitic plants. The Sandalwood tree is a root parasite,
frequently of the Mango tree.
However some parasitic plants can kill their hosts e.g.: The strangler fig.
Some plants exhibit a symbiotic relationship e.g.: lichens,
which is an association between a fungus and an alga.
This relationship benefits both the alga and the fungus.

The types of trees that grow in a particular forest community depend on the climate of the area and the type of soil found there. We have two major types of forest in India - Coniferous forests and Broad-leaved forests. The Coniferous forests are found in the Himalayas. The broad-leaved forests have several types:

Thorn forests

This type of forest is found in the dry arid regions of India. The vegetation here includes large thickets of thorny trees along with large expanses of grasslands. Most of the tree species here can withstand long dry periods.

Evergreen forests

The forests in the high rainfall regions of India are evergreen. The trees shed their leaves gradually throughout the year and are continually replaced by young leaves. The evergreen forest is thus green throughout the year and is never without leaves. Hence the name. These forests usually have more than a hundred species of trees along with a larger number of herbs, shrubs and climbers. Orchids, ferns, fungi and lichen are commonly seen. They are richer in plant species than other forest types.

Mangrove forests

These forests grow along the coast and the river deltas. Mangrove plants have breathing roots called pneumatophores which are special characteristic of these plants.

Deciduous forest

These forests are found in the drier regions of India. These forests have trees that shed their leaves in winter. Most of them flower after shedding their leaves. The new leaves begin to appear just before the monsoon.

Forest watch

India has several different types of forests. The forests in the north-eastern part of India, the Western Ghats and the Andaman and Nicobar Islands are richest in plant species. Natural forests provide food, medicines, fibre and shelter. They also play an important role in controlling local climate and water levels. It is cooler under the canopy of a forest than outside the forest. During the monsoon the forests hold water like a sponge and then release it slowly through the streams during the rest of the year.

Each forest system has its own variety of trees, shrubs, climbers and herbs alongwith specific insects, amphibia, reptiles, birds and mammals. A forest can be divided into three main layers:

The ground layer consists of grasses and herbs, the base of the trees, hollow logs, fallen branches, dead leaves, lichens, mosses, ferns and seedlings.

The middle layer consists of shrubs, palms, tree trunks, small trees and climbers. It is called the understorey.

The top layer is called the canopy and is mainly made up of branches, leaves, flowers and fruits of the trees.

A place where an animal lives is called a habitat.

A forest offers a variety of habitats for different animals. Different species of insects, birds, reptiles and mammals use different levels in the forest so that they do not come into direct competition with each other for food. Some plants and animals like fungi and ants use the forest floor. Fungi break down decaying plant and animal matter into nutrients that are absorbed by the plants. A large number of insects are also found on the forest floor. Others live underground. Partridges and quails feed on the forest floor for insects and worms. Several shrubs are found in the undergrowth. The flycatchers and tree frogs feed on insects found in this layer.

Several plants use tree trunks for support in the forests. These are the ferns and orchids which need moist and cool habitats. The calotes and the woodpeckers use the middle level on the tree trunks.

In the canopy, flowering trees are a source of food for different animals and birds. Trees with bright flowers attract a large number of insects and birds for nectar. The red whiskered bulbul is found in this layer looking for fruits, berries and insects. The giant squirrel only uses the forest canopy and rarely comes down to the ground.

Several mammals are found in our forests. The gaur is one of the largest herbivores of the forest and is very occasionally used by the tiger or a leopard as prey. The sambar deer is more common in hill forests than the chital. Lions are found only in the thorn forests in Gir. The tigers are found in a few National Parks and Wildlife Sanctuaries which have been included in areas called Tiger Reserves.

Besides these, mosses, small flowering plants on moist rocks and in waterfalls are also seen. Some of the old trees have large buttress roots. Giant creepers called lianas which are as thick as tree trunks connect one tree to another.

The forest is thus a fascinating complex system with a large number of interrelationships between plants and animals. Observation is the key to understanding these complex relationships which form the web of life of the forest.

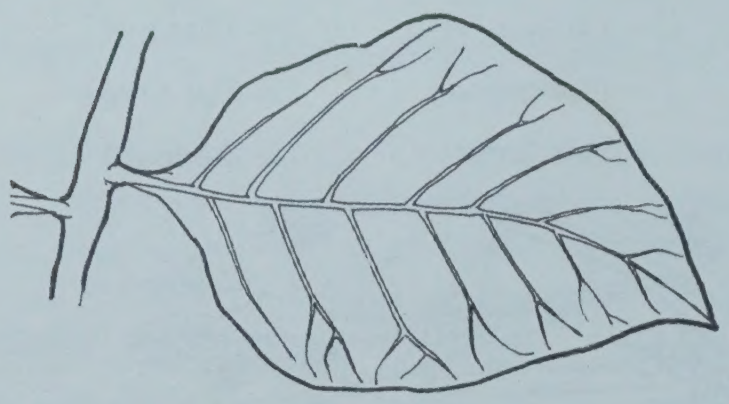
Activity

Can you place the following in the correct layer of the forest? One has already been placed for you.

01- Wood Spider
02- Lady Bird Beetle
03- Bracket Fungi
04- Termite
05- Woodpecker
06- Golden Oriole
07- Calotes
08- Quail
09- Giant Squirrel
10- Chital
11- Mongoose
12- Rat Snake
13- Langoor
14- Vine Snake
15- Fire Ants
16- Leopard

Tree watch

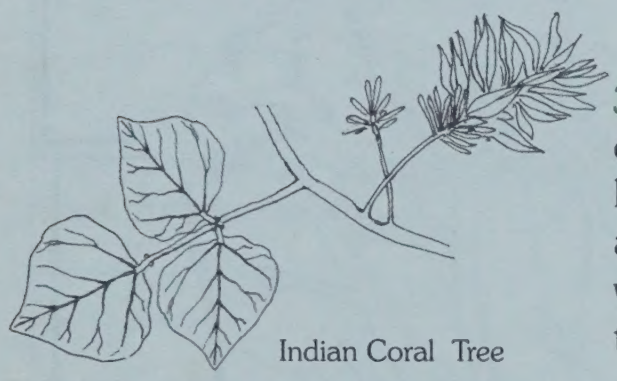
Each forest system has its own variety of trees, shrubs, climbers and herbs in the undergrowth. All forests are dominated by certain types of trees. You will find a large number of certain species of trees and fewer trees of other species.



Teak

1. Teak is more commonly found in forests in the South Western parts of India. The leaves are large and coarse. They leave an orange colour when rubbed on the skin. The fruits look like miniature balloons.

2. Ain is a large straight forest tree with deeply cracked bark, which look like the skin of a crocodile. Hence it is called as the crocodile bark tree. The fruit is brown when dry and has five longitudinal wings, which help in their dispersal by wind.

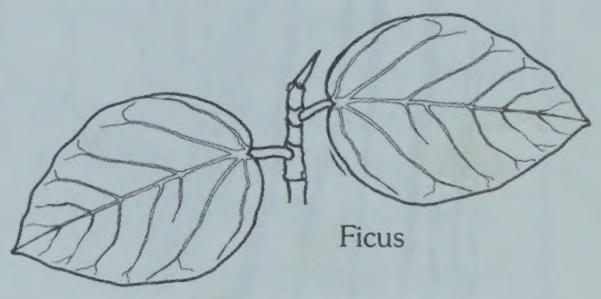


Indian Coral Tree

3. The Indian Coral Tree is found in forests all over India except the Himalayas. The stem is covered by prickles. It has dark red flowers at the tips of the branches which attract a large number of birds and insects. The pods are black when dry and remain hanging on the plant almost throughout the year.

4. The Flame of the Forest is called so because the bright orange flowers suggest a forest in flames. The flowers contain a large amount of nectar and hence attract huge numbers of birds and insects.

5. The Ficus tree produces fruit all the year round and is the main source of food for the fruit eating birds (frugivores) when other trees have no fruit. It is thus vital for the survival of several species of insects, birds and mammals.



Ficus

Cassia fistula

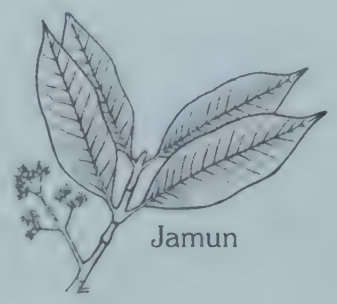
6. Cassia fistula or the Indian Laburnum is a deciduous tree found throughout India and seen in deciduous forests. The bright golden yellow flowers appear in long bunches about 0.5 metres long during the months of April-May. The pods are also long and tubular about 0.5 metres in length. This gives the plant its name-fistula which means a tube.

7. The Sal tree which is common in the forests in the North Eastern part of India is a valuable timber tree. The leaves of Sal when joined together form excellent plates.

Bark of
Red Silk Cotton

8. The Red Silk Cotton tree attracts a large number of birds when it is in flower. Some birds come for the nectar, some for the insects and some because the soft wood of the tree allows easy hollowing to make nesting sites. The straight horizontal branches of this tree are just right for supporting the huge combs of bees. The bark is covered with conical prickles. The seeds have silky cotton fibres, which help in their dispersal.

9. The Jamun tree is found all over India. The leaves are dark green, leathery with a prominent middle vein. They have a strong smell when crushed. The fruits are eaten by birds and humans.

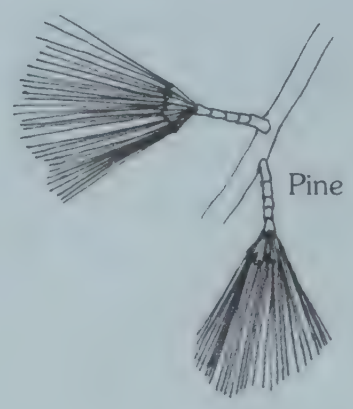

Jamun

Bauhinia

10. The Bauhinia is another forest tree found in India. It's leaves have two lobes and the flowers are pinkish white. The leaves are exchanged as a token of goodwill on the Dashera festival.

11. The name Deodar comes from the Sanskrit word 'Devdar' which means 'Tree of God' This very beautiful tall tree is one of the three most important timber trees of India found in the Himalayan region, the others being Oak and Pine.

12. The wood of Pine is not as durable as that of the Deodar but it yields large quantities of resin from which turpentine and resin are manufactured.


Pine

13. In March the Himalayan forests are ablaze with the red flowers of the Rhododendron.

Acacia

14. Acacia which is found in the drier regions is a small tree with an umbrella like crown. The bark is dark with deep furrows. It has long pointed spines near the leaves and small groups of tiny yellow flowers.

15. Mangroves are seen in the deltas of the Ganga, Brahmaputra and other rivers. These plants have special breathing roots (which come above the ground) with a soft spongy tissue that allows for gaseous exchange.

Activity

Observe the leaves, bark, flowers and fruits that are important characteristics by which we are able to identify the tree. Crush a part of each leaf and smell it. Each leaf has it's own kind of smell.

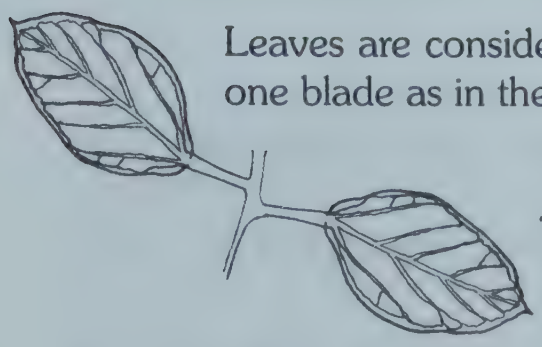
Activity

Can you match the following to the forest types they are found in? Some of these trees are also found in and around cities, in gardens, etc. Observe them and record their flowering season by colouring the relevant box.

	Deciduous	Evergreen	Mangroove	Thorn	January	February	March	April	May	June	July	August	September	October	November	December
Acacia species																
Teak																
Kadam																
Avicenia																
Deodar																
Sal																
Indian Coral Tree																
Rhododendron																
Ficus																
Jamun																
Mango																
Teak																
Pine																
Red Silk Cotton																
Flame of the Forest																
Bauhunia species																
Crocodile Bark Tree																
Banyan Tree																
Strangler Fig																
Bamboo																
Stobilanthus (Karvi)																
Orchid																
Tree Fern																
Cycas species																
Entada																
Memecylon																

Leaf Watch

Leaves are the food producing machines in a forest. They manufacture plant tissue from the energy which they get from the sun. The green colour of the leaf is due to chlorophyll which makes growth possible.

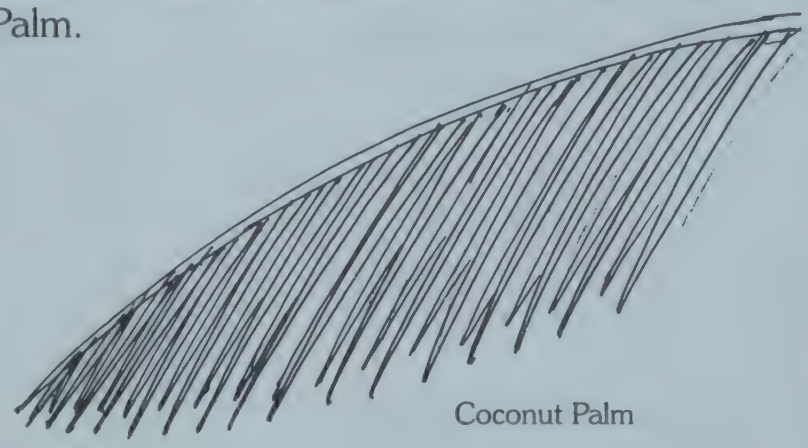


Leaves are considered to be simple when they have only one blade as in the Ashoka tree.

When there are multiple leaflets as in Tamarind it is called a compound leaf.

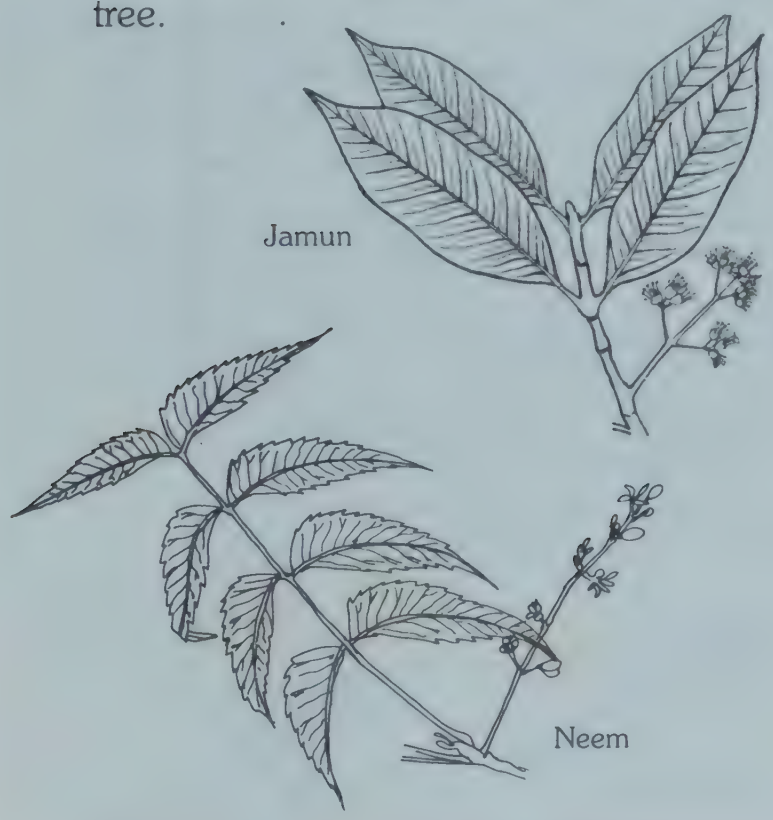
The size of leaves can range from a few millimeters as in the 'Touch-me-not' plant to a couple of meters as in the Coconut Palm.

'Touch-me-not'



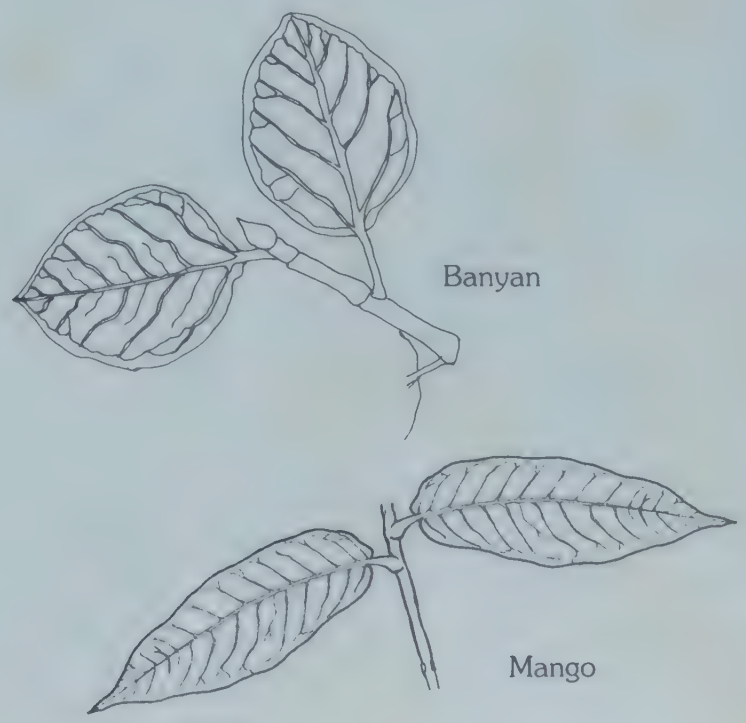
Coconut Palm

The margins of the leaf can be smooth as in the Jamun tree or serrated as in the Neem tree.



The leaf surface can be smooth as in the Rubber plant or rough as in the Teak tree. Some leaves have thorns on their surface while others may have thorns along their margins.

The shape of the leaf can be oval as in the Banyan tree or elongated as in Mango.



Activity

Crossword

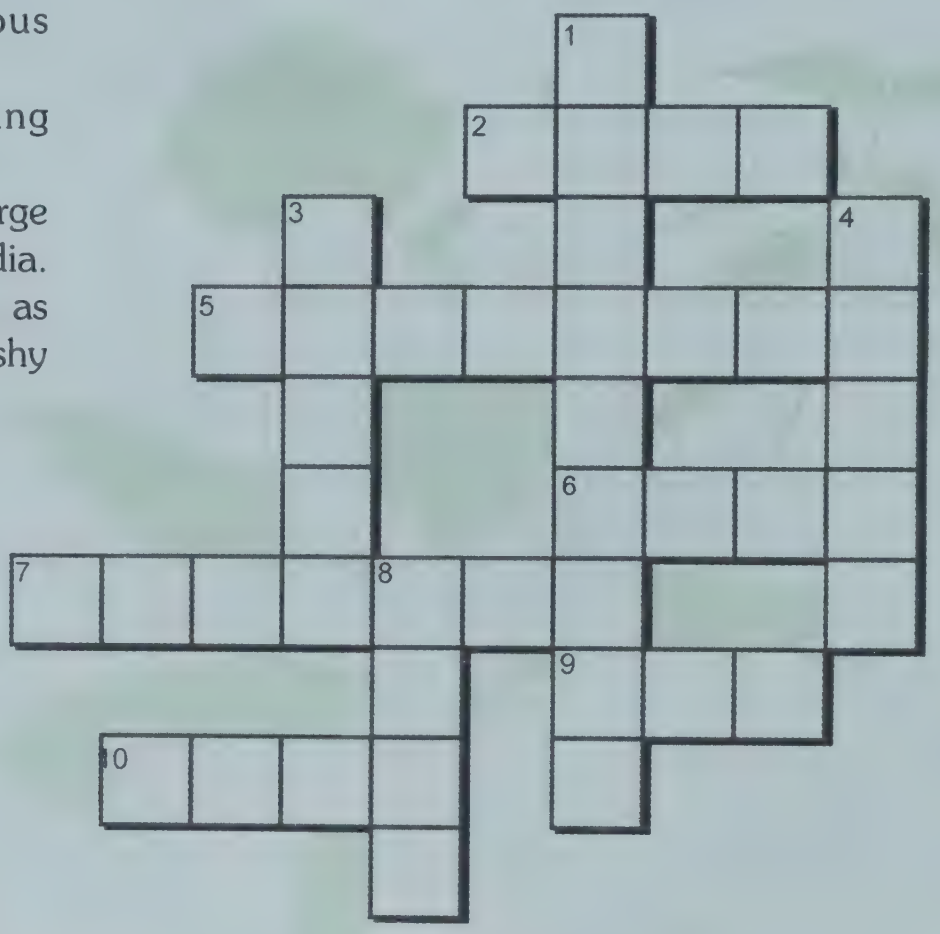
One of the ways to identify trees is by their leaves. In our day-to-day lives we make use of a variety of leaves for several different purposes. Can you guess the names of these trees from the uses of their leaves?

Across

2.This tree is found all over India. Leaves of this plant are offered to Lord Shiva.
5.The leaves of this tree have two lobes and are exchanged during the Dashera festival as a token of friendship.
6.Fruits of this tree are probably the richest known natural source of vitamin C.
7. This tree grows in coastal areas. Each and every part of this plant is used for various purposes. Fruits are used in religious ceremonies.
9.Leaves produce a refreshing drink, drunk all over the world. The plant is cultivated on a large scale in Assam and Southern India.
10.Leaves of this plant are used as a remedy for cough and are fleshy with thorny margins.

Down

1.Leaves of this plant are used for seasoning and make great food for caterpillars of a butterfly called the Common Mormon.
3.Leaves of this plant adorn doorways and are used in religious ceremonies. The fruits are delicious, appear during the summer season and are called as the 'King of Fruits'.
4.This tree is also called the 'Flame of the Forest'. Leaves are used to make plates and bowls.
8.Leaves of this plant have very high medicinal value and are eaten during "Gudipadwa' (The Hindu New Year) festival. The leaves are a natural insecticide.



Activity

Close your eyes. Ask your friend to guide you to a plant. Is the bark smooth, scaly, rubbery, flaky or bumpy? Does it have spines or thorns? Feel the leaf, touch the upper and lower surfaces of the leaf. Feel its edge, smell it, but do not open your eyes! How many trees can you recognize this way? Compete with your friend to see who knows more trees.

Insect Watch

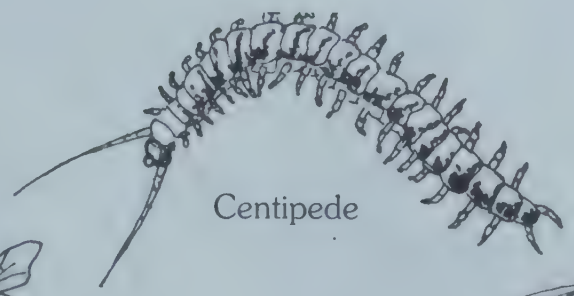
Insects are found almost everywhere. Insects are a very successful group of animals. This is mainly due to the fact that they can adapt easily to a variety of habitats and due to their high reproductive rate. They produce a large number of offspring. Most of them also have excellent camouflage and strong defence systems.

What is an insect ?

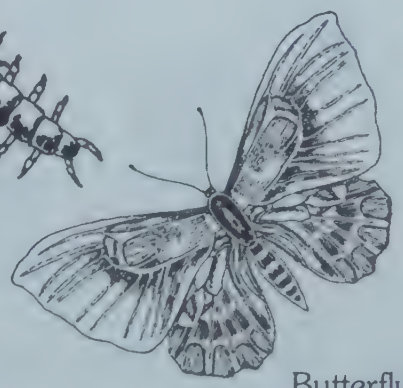
Insects belong to the group of animals called arthropods. Arthropods have jointed legs and their bodies are divided into segments.

Millipede

Bee



Centipede



Butterfly

Spider

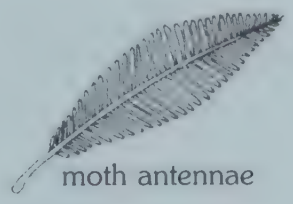
Insects do not have a skeleton inside their body for support but have a hard outer covering called an exoskeleton. The outer layer of the exoskeleton is waxy and acts like a waterproof raincoat.

Insects are the only invertebrates that can fly. Only the adult insects have wings.

Insects have simple as well as compound eyes.

All insects have antennae which are used to feel, smell and hear. Insect antennae differ in size and shape depending on how they are used. Insects with poor eyesight (ants and grasshoppers) have long antennae, while those with good eyesight (dragonflies) have smaller antennae. Insects can be easily identified by their antennae.

mosquito antennae

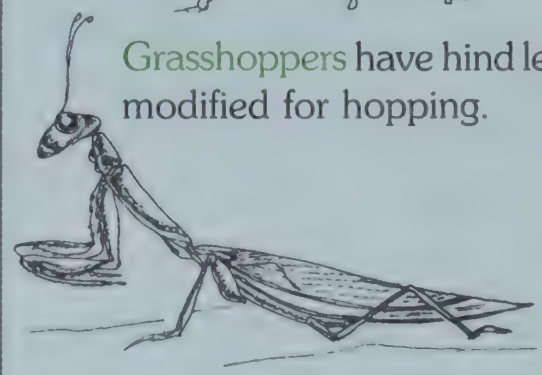


moth antennae

Insects produce chemicals called pheromones to communicate with other insects.

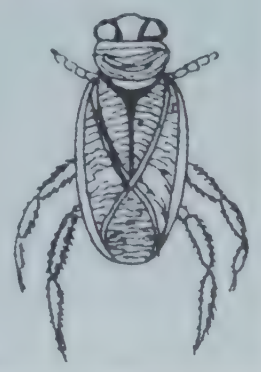
A large majority of insects have six legs. Depending on where an insect lives and what it eats, the legs differ.

Grasshoppers have hind legs that are modified for hopping.

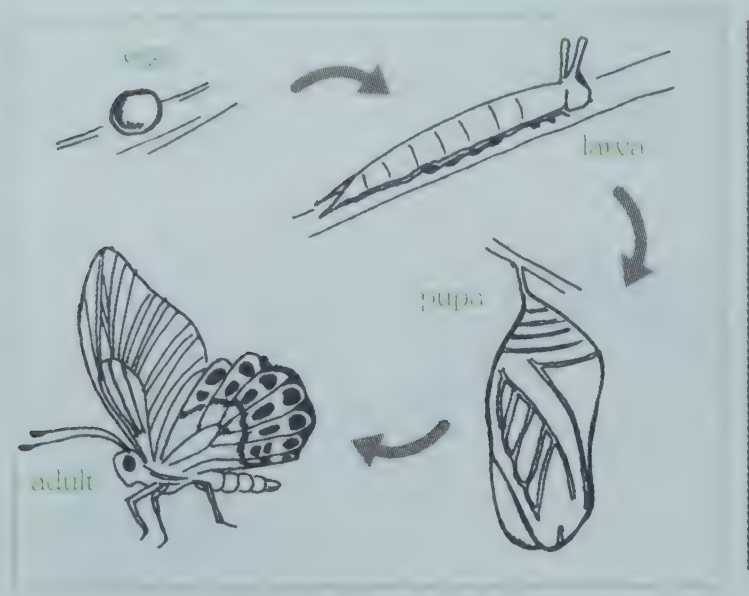


Praying mantids have grasping forelegs with which they catch their prey.

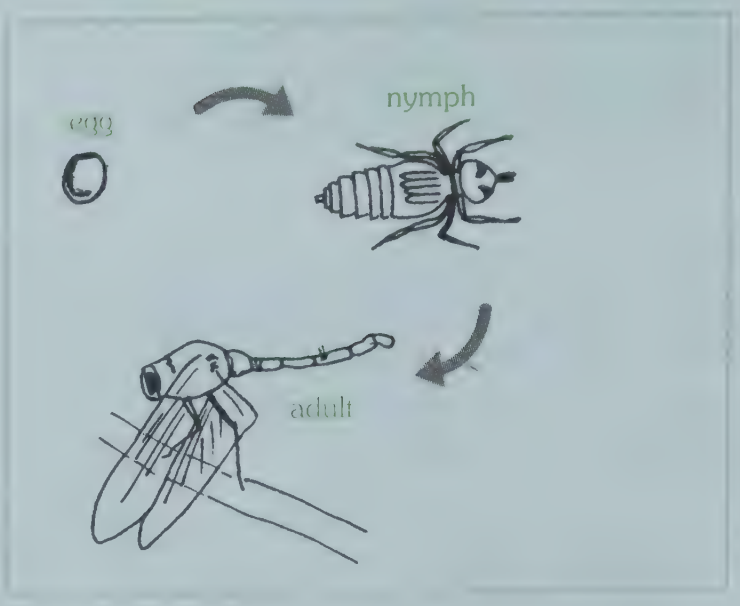
Water boatmen have flattened oar-like legs to help them paddle.



Complete metamorphosis



Incomplete metamorphosis



Some insects go through four stages: egg to larva to pupa and then to adult. This is called complete metamorphosis. The young ones of these insects are called larva and are very different in appearance from the adults. They do not eat the same food as the adults. The larva then changes into a pupa, undergoes many chemical changes and emerges as an adult.

Some insects go through three life stages: egg to nymph to adult. This is called incomplete metamorphosis. When nymphs hatch from the egg, a majority of them look like miniature copies of their parents, although they don't have wings. The nymphs then moult a few times before they become adults.

Can you observe insects around you and identify which of them undergo complete or incomplete metamorphosis ?

You will find insects all over the forest in the plant stems, under the routes, in the leaves, under the bark of trees. Some, like the honeybees, build hives of wax.

Paper wasps make nests of chewed up food, while termites build their mounds of soil and ants makes their nests with leaves.Observing insects can be very fascinating. Watch how the legs work, where the mouth is and how it finds its food.

Can you give two similarities and two differences between a caterpillar and an earthworm?

Activity

Circle all the animals that are not insects.

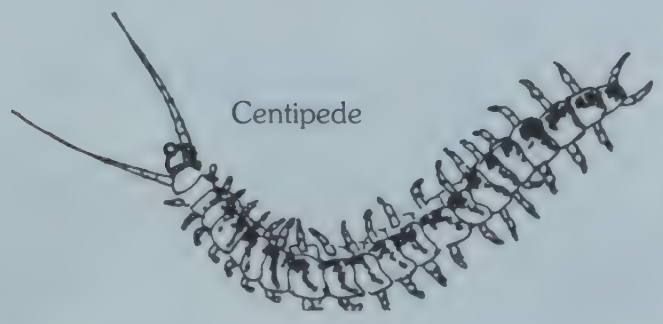
Butterfly

Bee

Moth

Millipede

Grasshopper



Centipede

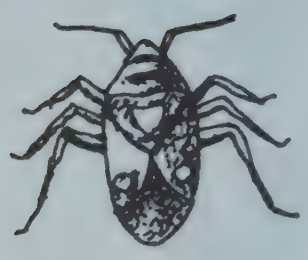
Dragonfly

Praying Mantis

Stick insect

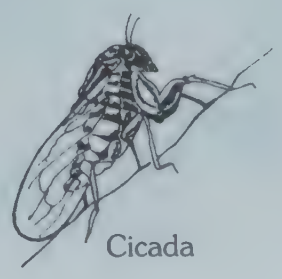
Damselfly

Spider

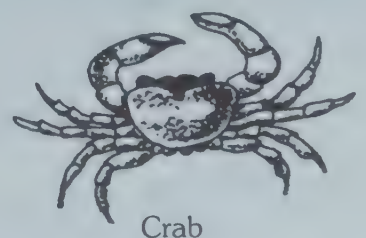


Bug

Mayfly



Cicada



Crab

Butterfly - Moth Watch

As you walk through the forest, you will see colourful butterflies that flit from flower to flower. They are one of the most important agents that bring about pollination of the plants. Butterflies and moths can be distinguished from other insects by their large colourful wings. The colour of the wings is due to the thousands of tiny, delicate powdery scales. Both moths and the butterflies have two antennae, six legs, two pairs of wings and scales on the wing. They however have certain characteristics which make them different from each other.

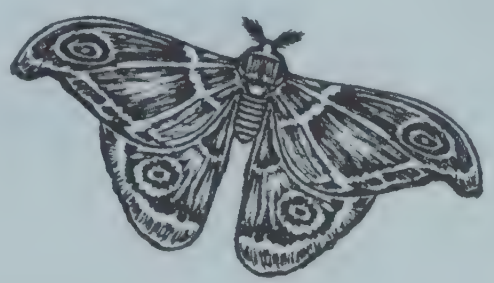
Moth

Antennae are feathery

When resting, moths spread their wings flat

Have a plump abdomen

Usually fly by night



Butterfly

Antennae are clubbed, and have a swelling at their tip

When resting, butterflies fold their wings over their backs.

Have a slender abdomen

Fly by day

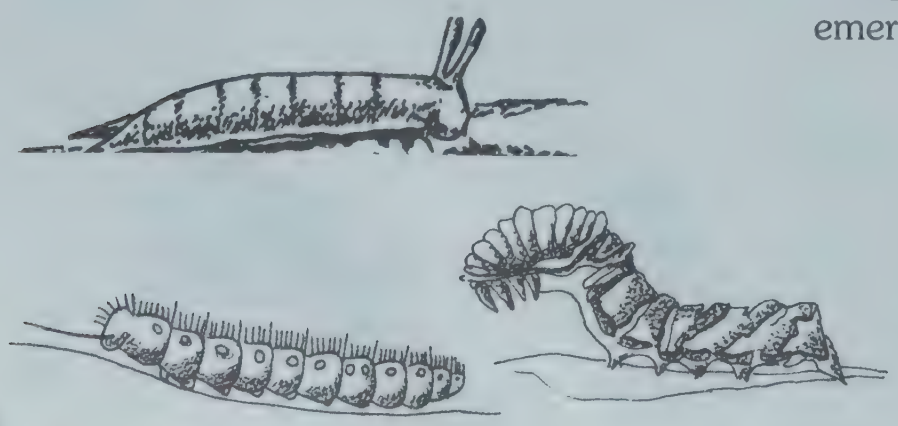
Some interesting facts.....

Butterflies require different types of food for the caterpillar and the adult stages. Each species of butterfly lays its eggs on leaves of a specific plant on which the caterpillars feed.

Butterflies are superb botanists ! They never make a mistake in recognizing their favourite plant. The adult butterfly does not eat leafy material as it does not have chewing mouthparts. However using its proboscis it sucks nectar from a variety of flowers.

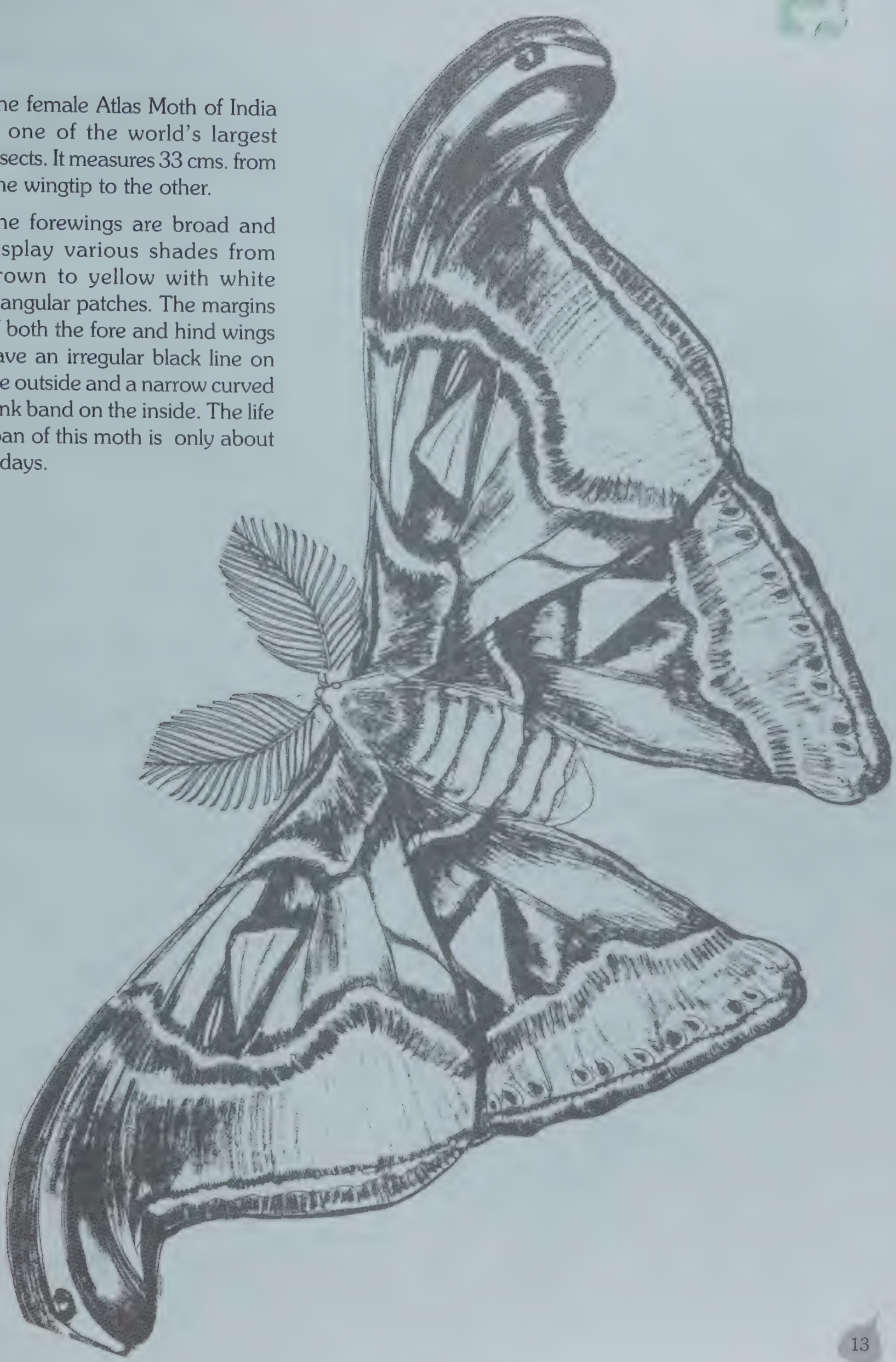
All butterflies have a similar life cycle. The cycle begins when the adults lay eggs.

The young caterpillar eats through the top of the egg, creating a hole through which it emerges. After hatching, it often eats the eggshell as its first meal, as it has valuable nutrients. The caterpillar moults 4 to 5 times before it becomes a pupa. During the pupal stage its outward appearance changes and the wings, proboscis and compound eyes appear along with the scales. The adult butterfly then emerges from the pupa.



The female Atlas Moth of India is one of the world's largest insects. It measures 33 cms. from one wingtip to the other.

The forewings are broad and display various shades from brown to yellow with white triangular patches. The margins of both the fore and hind wings have an irregular black line on the outside and a narrow curved pink band on the inside. The life span of this moth is only about 7 days.

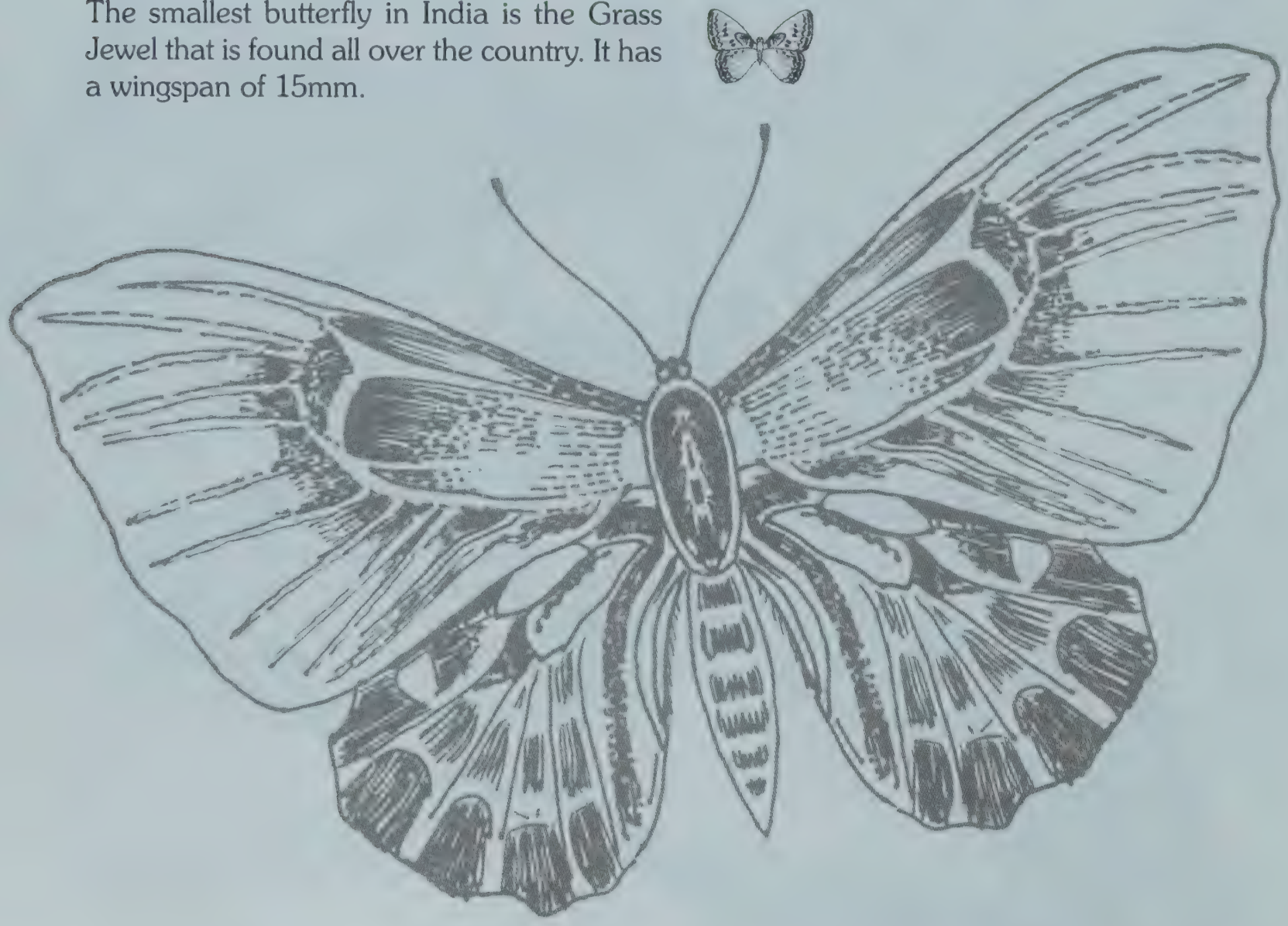


Activity

You can attract butterflies by growing flowering plants that have a lot of nectar as well as plants for caterpillars. Some of the plants that attract butterflies are given below. Can you observe some more and make a list with the help of your teacher? Try growing these plants to attract butterflies.

Plant	Butterfly	Plant	Butterfly
Lime plant			
Indian Laburnum			
Nirgudi			
Bamboo			
Ashoka			

The smallest butterfly in India is the Grass Jewel that is found all over the country. It has a wingspan of 15mm.



The largest butterfly in India is the Common Birdwing that is found in the evergreen forests of the Western Ghats. It has a wingspan of 190 mm.

Ant watch

Many animals improve their chances of staying alive by living together in specialized communities to find food, raise their young and for protection against enemies. Ants, bees, wasps and termites live as members of large colonies in which each individual has a different job to do. (Some collect food, some defend the colony, some look after the young ones, some clean the colony, etc.)

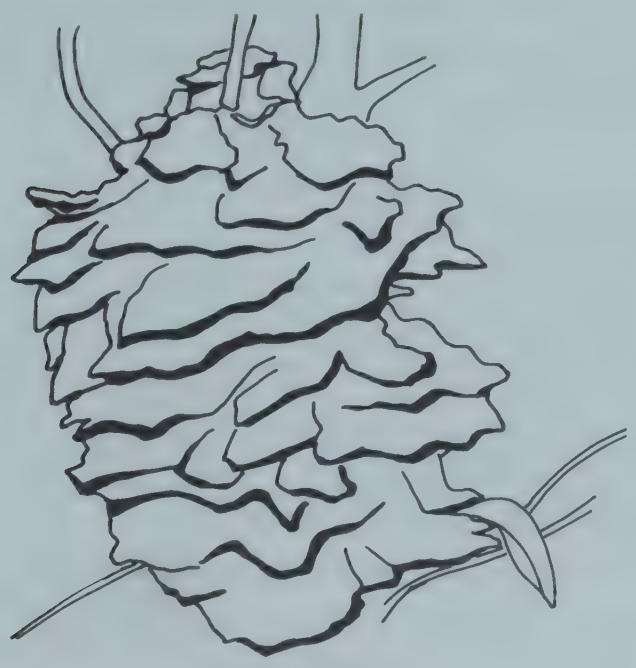
In the forest you will see ants on the ground, on the bark of trees and even on the leaves. There are different species that live in different habitats within the forest. Ants form their colonies in the ground, beneath the bark of trees and under rotting logs. Look for the black tree ants or the red tree ants or the small brown ants. The black tree ants, build globular nests of papery material. When disturbed it raises its abdomen in a threatening posture. If you look up towards the canopy you will find nests of the red tree ant. It makes a nest out of leaves using the silk produced by the larvae. They sew the adjacent leaves together in the canopy of the tree, forming large spherical nests.

On the ground you can see small mounds made of very fine mud with an opening at the top. The top of the mound may be built also like a rosette. These are the nests of the small brown ants.

Have you spotted the ants yet?

Did you know?

An ant can lift more than 50 times its own weight. Some ants keep slaves. They attack other nests, kill the queen and take the worker as prisoners.



Nest of the Red Tree Ant

Ants are omnivorous, feeding on plant and animal matter. Some ants feed specifically on spiders and their eggs, while others called harvester ants feed on the seed of grasses that are stored in their nests for food. Ants sip nectar from flowers and pollinate them during feeding.

Ants communicate in a variety of ways such as releasing a chemical called pheromone which leaves a scent trail. They also communicate by rubbing antennae with other ants or rubbing portions of their bodies with other ants. As the ants follow the trail left by the first ant, they secrete a similar odour, making the trail stronger.

An Ant Colony

There may be as many as a million ants in one colony. An average ant colony may have half a million ants. Each ant colony has only one queen, along with several hundreds of workers, who are mostly female. Depending on the type of work they do, the size of the worker ants differ. Larger worker ants act as soldiers to defend the nest. Smaller worker ants look for food.

Activity

Watch the ants carefully. Is there any pattern to the movement of ants? Are they carrying food? Where are they going? Can you trace their nest? Are they touching each other while moving? What do you think they are saying?

Termites also build mounds similar to ants and have a similar social structure. Here however the queen as well as the king stay in the same nest. The height of a termite mound can exceed 4ft. These mounds are very strong.

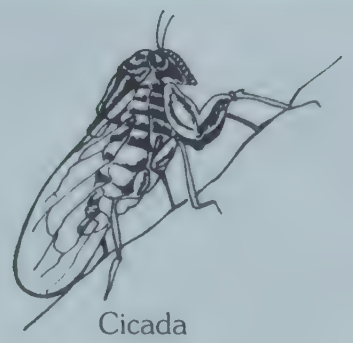
Did you know?

Termites are superb engineers. A termite colony usually is like a fortress made of mud and about 3-4 feet tall. It is made by the termites, each carrying a pellet of mud. The many chambers are interconnected and tunnels run off in all directions from the base of the nest. Can you imagine how these tiny insects construct such a beautifully designed, functional, large scale building?

Bugs

These are a large group of commonly seen species. Some of the bugs are brightly coloured. They could be red, orange, metallic green or blue or black with spots or bands on their body. Half of the forewings of bugs is tough and leathery while the other half is delicate and transparent. Therefore when the wings are rested over the body it forms the shape of an 'X' by which the bugs can be identified as bugs. Some bugs feed on plant sap while some like the bed bugs on blood of animals. They have piercing-sucking mouth parts.

Bug



Cicada

Did you know?

The loudest singer among the insects is the Cicada. Its absence has given the Silent Valley of Kerala it's name.

An interesting character of bugs is that many of them can produce sounds like the grasshoppers and crickets. Bugs also possess special glands that secrete toxic substances which they use to repel predators.

Beetles

These are also very colourful but unlike the bugs the forewings are hard, thus distinguishing them from the bugs. Beetles feed on plants, seeds, fruits, nuts and dead decaying matter and animals. They have biting and chewing mouthparts.

Did you know?

Beetles are a group of animals that have the largest number of species in the world.

The Rhinoceros beetle has a horn like projection similar to the rhino. hence its name. The Rhinoceros and the Long horned beetles are the largest in India.

Lady bird beetle

Dung beetle

Tortoise beetle

Jewel beetle

Lady bird beetles feed on aphids, scale insects, mites and white flies. They are thus natural pest controllers. The blister beetle gives off a chemical that causes blisters when it is disturbed.

Activity

Have you seen tiny insects in the gram flour or in pulses in your home ? These are also beetles. Observe them carefully with a hand lens. Discuss your findings with your friends.

Activity

Can you match the insect with it's antennae?

Dragonfly

Beetle

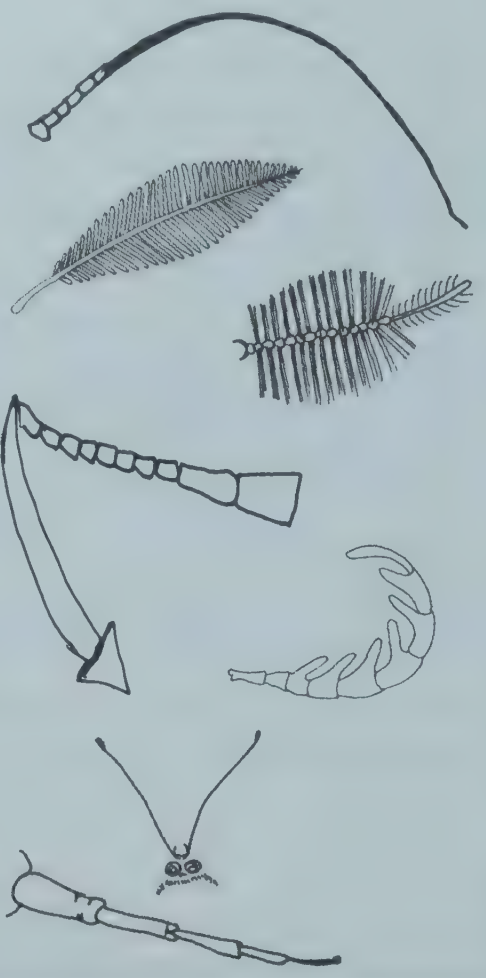
Mosquito

Butterfly

Moth

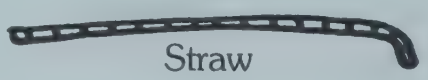
Ant

Cockroach



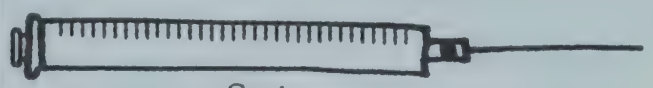
Activity

Every insect has a different mouth part depending on what it eats. They can be compared to certain instruments we use. Can you match the insect to its mouth part which is depicted as an instrument?



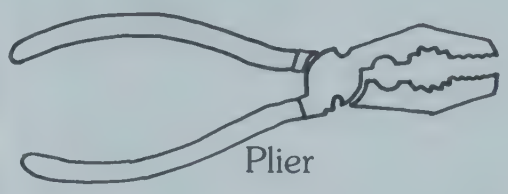
Straw

Grasshopper



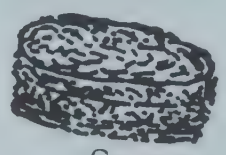
Syringe

Butterfly



Plier

Fly



Sponge

Mosquito

Spider Watch

As you are walking through the forest, you can see the spider webs on the grass, in the hollows in the ground or just huge webs strung between two branches. Very often if you watch quietly and carefully you will see the spider. The spider also belongs to the phylum Arthropod, but it is not an insect.

The peculiarity of the spiders is their ability to spin silk which is an integral part of their life. They are born in silk, their cocoons are of silk, their webs are of silk and they capture their prey with silk. They have silk glands and spinning organs at the hind legs.

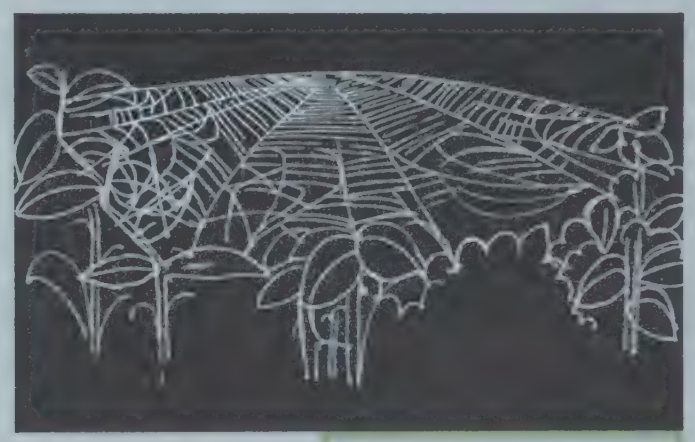
A spider uses threads of different thickness, textures and strengths for different purposes. Sticky threads are made for catching prey, strong non – sticky threads are used for building web foundations while fine threads are used for making nests.

Activity

Do you know of any other animals that build traps to catch their prey?

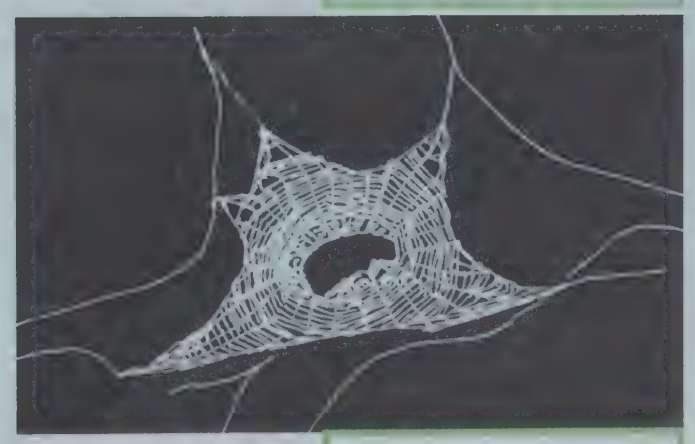
Can you draw the spiders seen on each of these webs? Be very quiet and patient, it's only then that you will see the spider.

Orb web



Dome web

Sheet web



Tunnel web

Bird watch

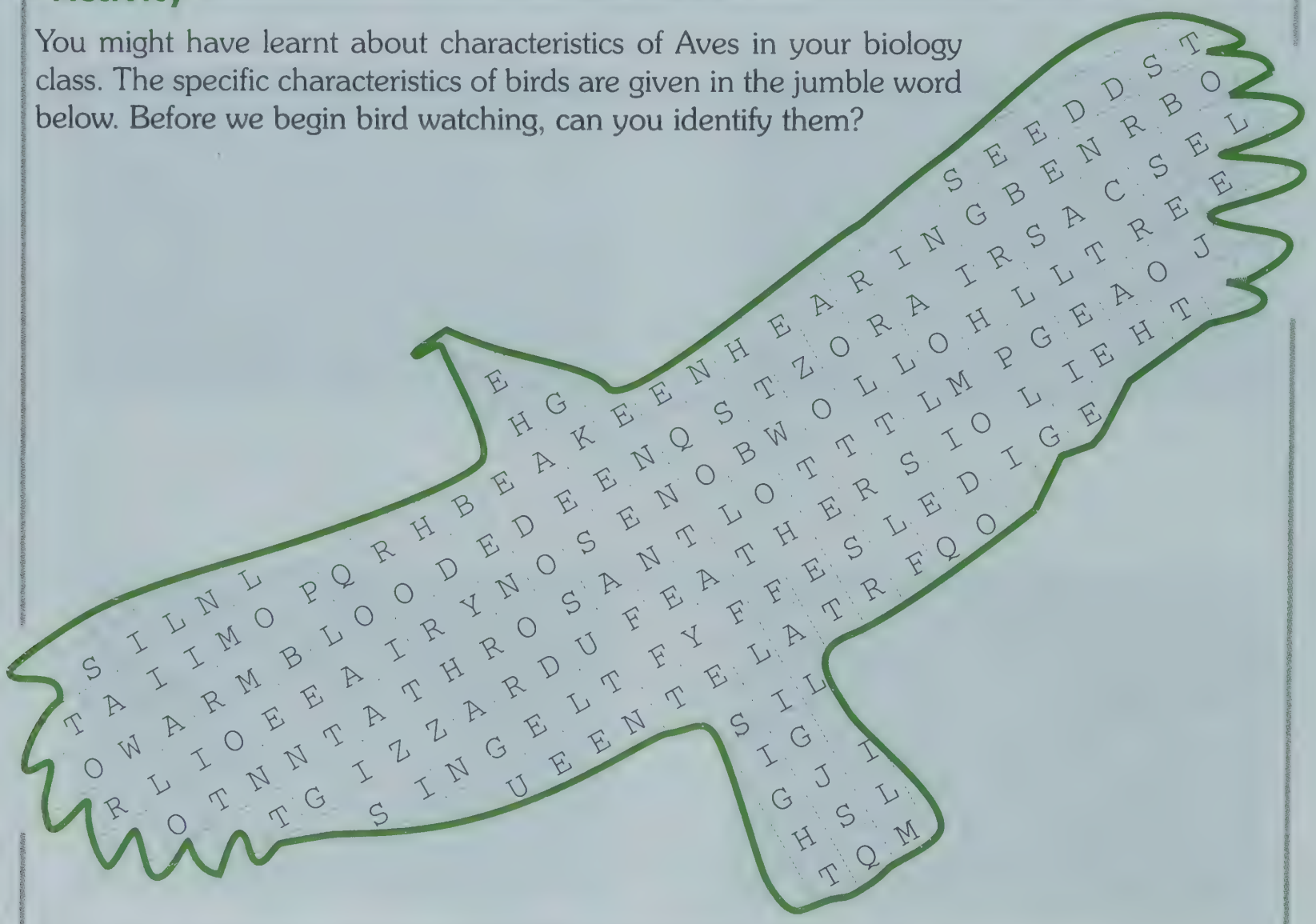
The forest is full of bird life. Birds belong to the group of animals called vertebrates (Fish, amphibians, reptiles, mammals also belong to this group). Within this they are in a special class called Aves.

Different species of birds occupy different layers in a forest. The canopy (top layer) is used by birds such as the drongos, minivets and the orioles. The trunk and large branches (middle layer) are home to the woodpeckers and barbets. Hornbills nest in this layer in large holes. Babblers and thrushes live in the shrubs. The ground layer species such as the quails, patridges, jungle fowl skulk around for worms. Birds are fruit eating (frugivores) such as koels, mynas and bulbuls or insect eating (insectivorous) such as the drongo, flycatchers and green bee eaters. Some of them are omnivorous.

Common birds like the bulbuls, green bee eaters, babblers, drongos, mynas can be seen in a visit to any forest. However in an undisturbed forest you will see birds such as the hornbills, paradise flycatchers, racket tailed drongo and the peacock. If you observe the sky carefully you will see a large bird like an eagle soaring in the sky. This is a bird of prey, which feeds on other smaller birds.

Activity

You might have learnt about characteristics of Aves in your biology class. The specific characteristics of birds are given in the jumble word below. Before we begin bird watching, can you identify them?


S I L N L
T A I I M O P Q R H B E A K E E N H E A R I N G B E A K
O W A R M B L O O D E D E E N Q S T Z O R A I R S A C S E
R L I O E E A I R Y N O S E N O B W O L L O H L L T R E E
O T N N T A T H R O S A N T L O T T T L M P G E A O J
T G I Z Z A R D U F E A T H E R S I O L I E H T
S I N G E L T F Y F F E S L E D I G E
U E E N T E L A T R F Q O
S I L
I G
G J T
H S L
T Q M

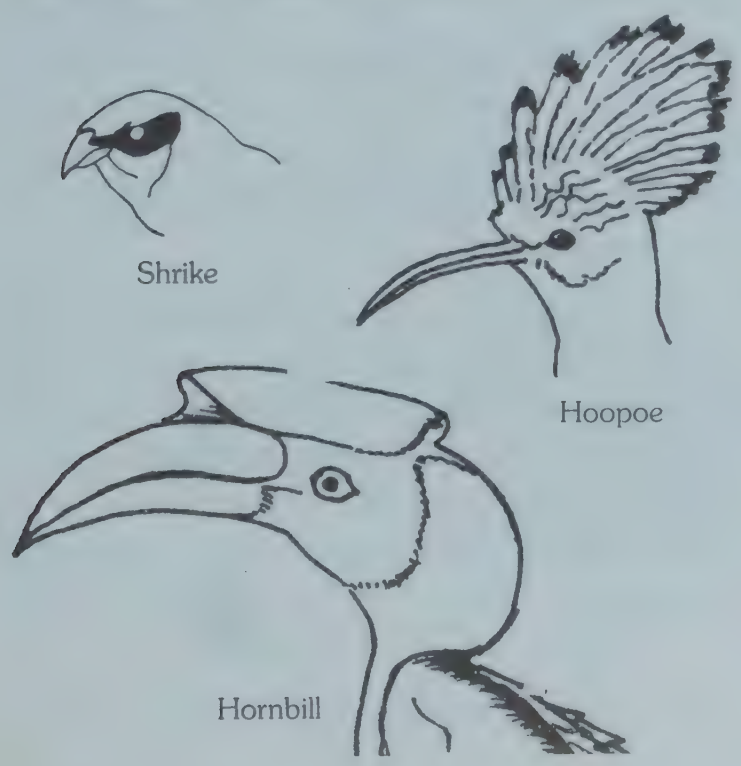
Most people feel that bird-watching involves learning technical terms and complicated names. This is however far from the truth. Can you recognize a parrot, a crow, a sparrow, a peacock or a pigeon? See you already know birds. When you see a peacock you know it's a peacock, because of its appearance, colour and its magnificent tail. The first step towards birdwatching is therefore observation. You could start by observing birds that you see in and around your school or house.

Steps to identify birds

Size: This is the first identification feature. However something that is large for you, may not be large for others and vice-versa. Therefore the sizes of birds are always described in relation to common birds such as the house sparrow, common myna, house crow, eagle etc. When you are making a note of the size of your bird, write it is as such (smaller than a house sparrow, or similar to a crow in size or bigger than a myna, etc.)

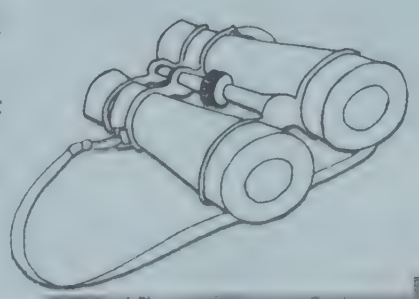
Colour: This is another prominent feature for identifying birds. Note down the overall colour of the bird. (White, greenish, bluish, greyish, blackish, etc.) What is the colour of its back, under parts, wings ? What is the colour on the head or of its tail?

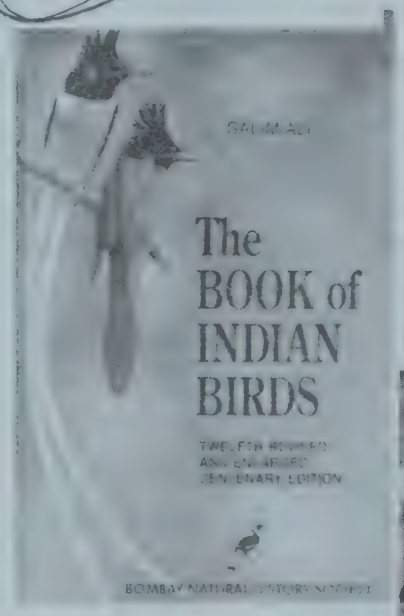
Markings: Many birds have similar colours. Therefore one must also look for distinctive markings on the bird. Does the bird have a crest on its head? Does it have an eye stripe? Does it have a patch of colour on the wing?

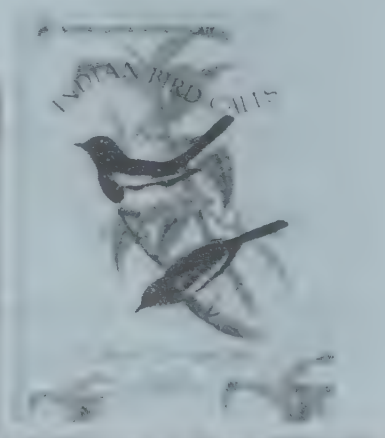


Calls : This is a very important feature for identifying birds, especially when it cannot be seen clearly. You can note down the call and then use the cassette of Indian Bird Calls produced by the Bombay Natural History Society to identify the bird.

With repeated observations you will be able to identify a bird simply by its shape or by its call.







The CD on The Biodiversity of India gives comprehensive information about India's birds and other wild life.

Shape: All birds have very distinct shapes, by which they can be recognized even in dim light or by their silhouette appearance. The shape is a combination of the physical features like the posture, build, head, beak, wings, legs and tail.

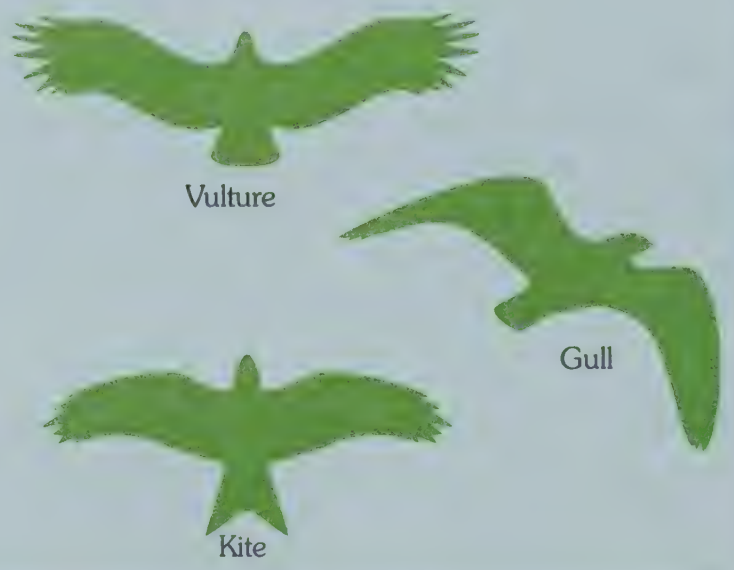
Posture is the way a bird sits, walks and flies. Some birds fly with their neck curved in an 'S' shape, some others with their neck stretched out. Paddy birds are normally seen with a 'hunchback' stance.

Build means whether the bird is long and thin or small and round. Egrets are tall and thin. Partridges are round and fat.

The head could be round or with a crest.

Birds have a variety of beak shapes. Most birds of prey have a hook tipped beak, the kingfisher has a long dagger like beak, bee-eaters have short curved beaks.

The wings could be pointed as in swifts, longish and broad as in eagles.



Behavior : Birds have different behavioral patterns. Is the bird flitting about in the trees? Is it flying high above the ground? Does it have a specific flight pattern? Does it hop on the ground? Is it restricted to the trunk of trees? What is it eating? These characteristics can also be used for identification.

Habitat : Most birds have very specific habitat preferences and one can find them in more or less the same area. Grassland birds cannot be found in a forest and vice-versa. Even within a forest certain birds are canopy birds, others prefer the ground layer.

Follow the simple steps given above to identify the birds you see around you. Remember the key is 'observation'. Birds can be very colourful and have interesting habits which can be used for identification.

The most popular field guide for birds is Salim Ali's 'Book of Indian Birds', produced by the Bombay Natural History Society. Once you have noted down all these characteristics, the field guides and your teacher can help you identify all the birds seen around. Happy bird watching!

Activity

Can you find the appropriate bird associated with the following?
Write a description or draw a picture of the bird in the space provided. If you have been able to fill all the boxes, you are on your way to becoming an ornithologist!

Green colour

Yellow colour

Ficus fruits

Insects

Seeds

Nectar

Groups

Ground

Mammal watch

What are the characters that distinguish mammals from other animals? The name 'mammals' refers to the possession of mammary or milk glands and thus describes the most distinguishing feature of mammals. No other animal in Nature possess this characteristic .

When one thinks of forest mammals, the first that come to mind are of course the magnificent tiger and the lion. Do you know that India ranks 8th highest in the world for mammal species?

The vegetation type and climatic conditions of a country are mainly responsible for the distribution of mammals because most mammals depend on one or the other type of vegetation and the type of vegetation depends upon the climatic condition of a place. The extremely diverse variations in landscapes in India – the Himalayas, the deserts of Rajasthan, the semi arid grasslands of Central India and the isolated Andaman and Nicobar islands contribute to the large number of various types of mammals in our country.

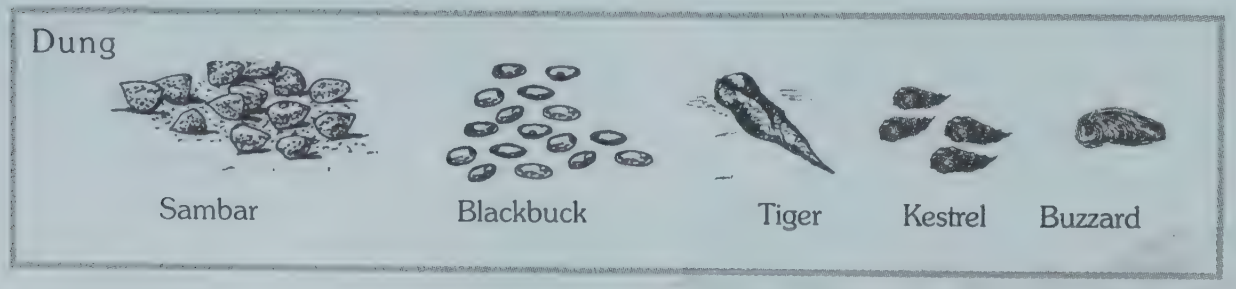
Most of the forest animals are however difficult to spot. If you are very quiet and lucky you may spot langoors, chital deer, sambar and mongoose. Depending upon which part of the country you are in.

However if you are very observant there are signs all over the forest which indicate the presence of these animals. Tracks, pug marks, hoof prints and animal dung provide clues to movement patterns of animals.

The pugmarks of a tiger show only four of the five toes, because the fifth toe is well above the pad and does not touch the ground while walking. Animals that climb trees or dig for food have characteristic law marks. Animals that stalk their prey very often place their hind feet in the steps of the forefeet, thus depicting a straight line. Animals with long hind legs such as squirrels and hare move in a series of jumps. The hind feet thus come together and touch the ground ahead of the front feet. Their tracks thus fall in groups. Animals with short legs and wide heavy bodies leave deeper prints.

Peacock feather

Porcupine quill



Activity

The forest is full of signs. These signs have their own stories to tell. Can you identify the animals from the clues they have left behind? How many could you see during your forest walk? Using the ones given below and those that you have seen, make your own story. Use extra sheets if necessary.

Squirrel

Hare

Fox

Wild dog

Wild Boar

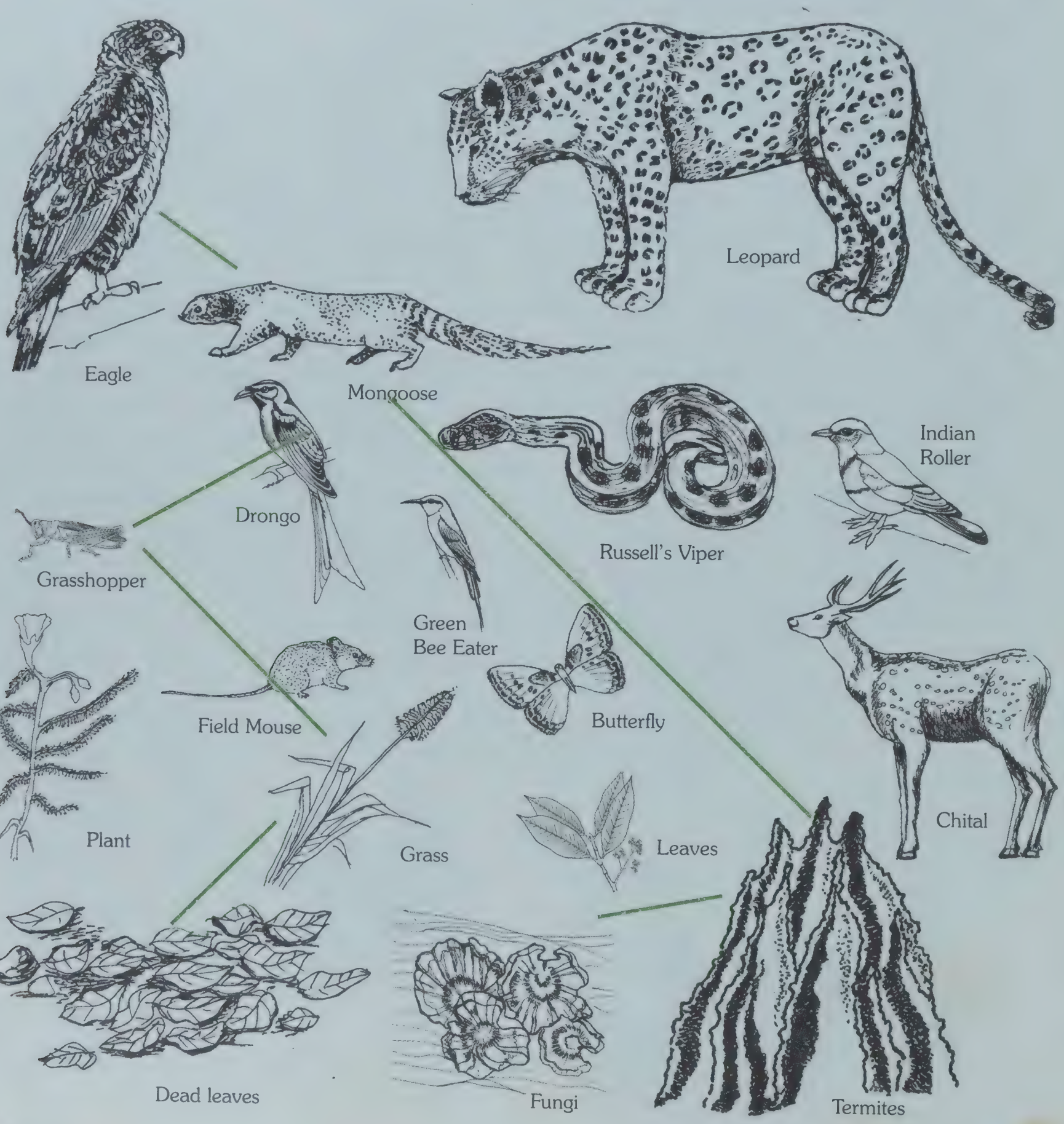
Sambar

The forest community

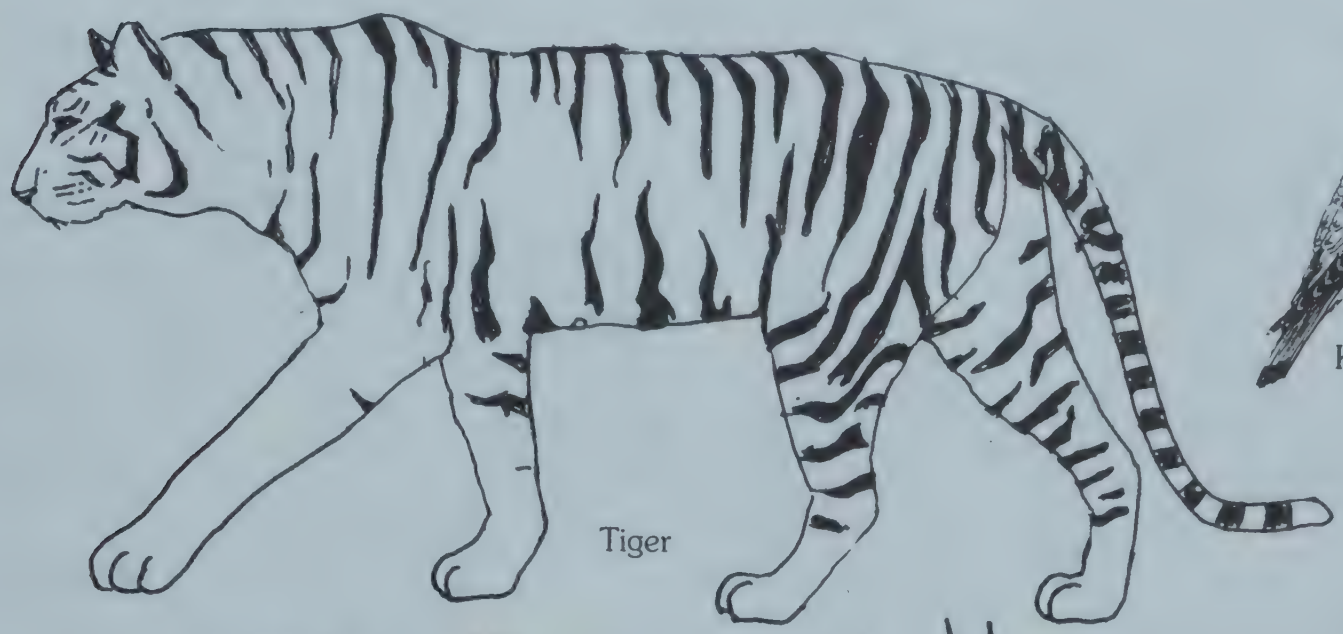
A forest is a community of plants and animals. Different animal species occupy different layers in a forest, thus allowing for greater diversity. Each of these animals and birds feed on specific plants and animals.

Activity

Using the various components given below create at least five food chains and link them to form a food web.



You may have seen spiders catching different insects. These insects use plants as their food. This is thus a simple food chain which links plants with herbivorous insects which are linked to carnivorous spiders. The insects may also be eaten by insectivorous birds. Thus several food chains may be linked to each other. This forms a food web.

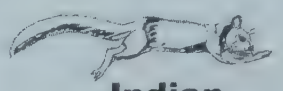


National and state Symbols

All of us know that the tiger is our National animal and the peacock is our National Bird. Why do you think that these two animals have been selected as National symbols? What do they represent? Do you know that each state has its own state bird and animal? Have they been selected because they are abundant in the state or because they are threatened and endangered? Find out.....

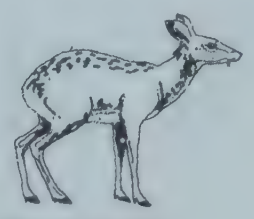
Can you match these animals to their respective states.

Blackbuck
3

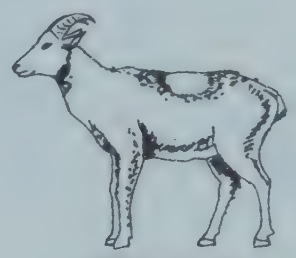


Indian
Giant Squirrel
18

Hangul
6

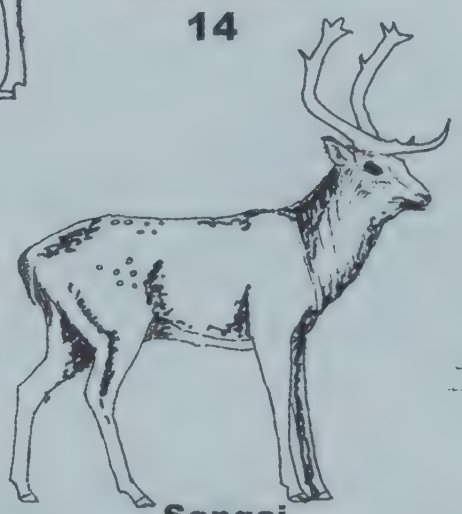


Himalayan
Musk Deer
14



Nilgiri Tahr
17

lephant
1



Sangai
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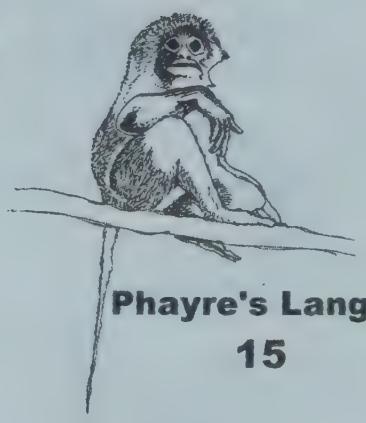

Phayre's Langur
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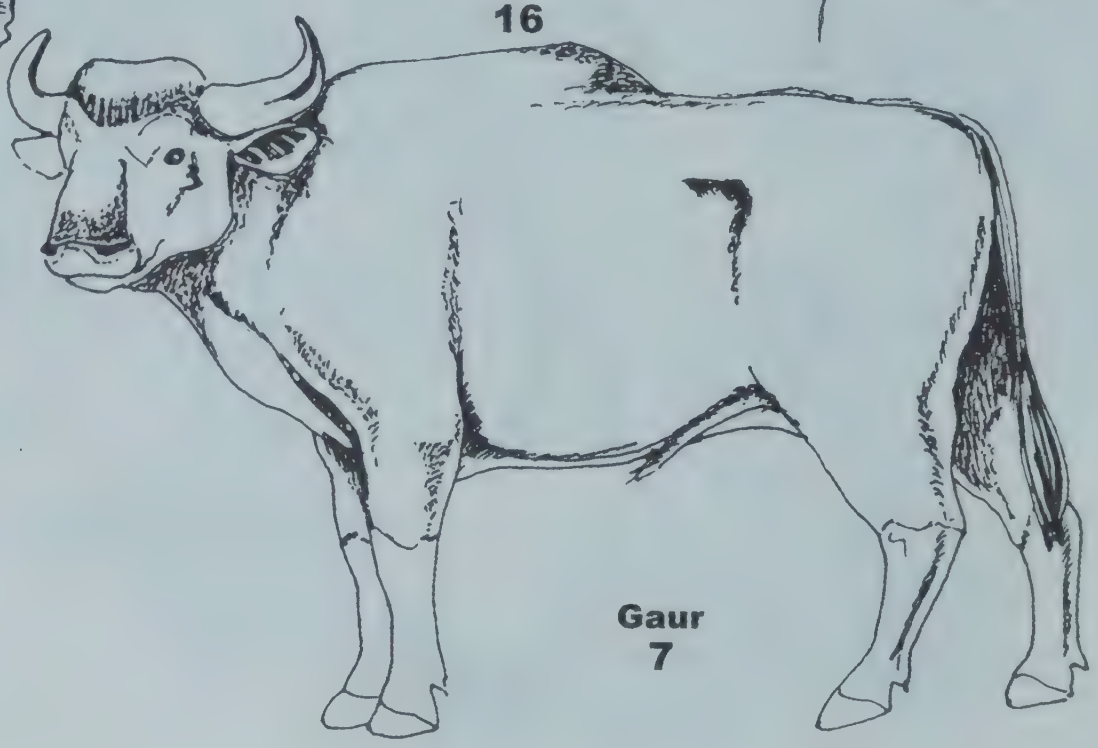
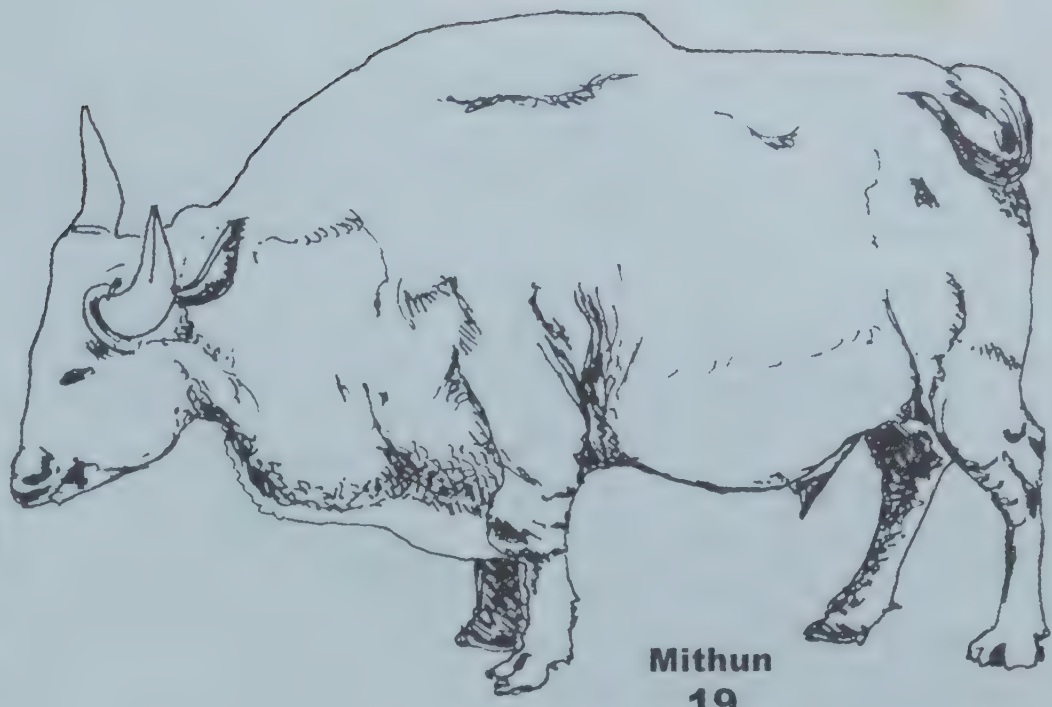
Chinkara
10



Gaur
7

Swamp Deer

11

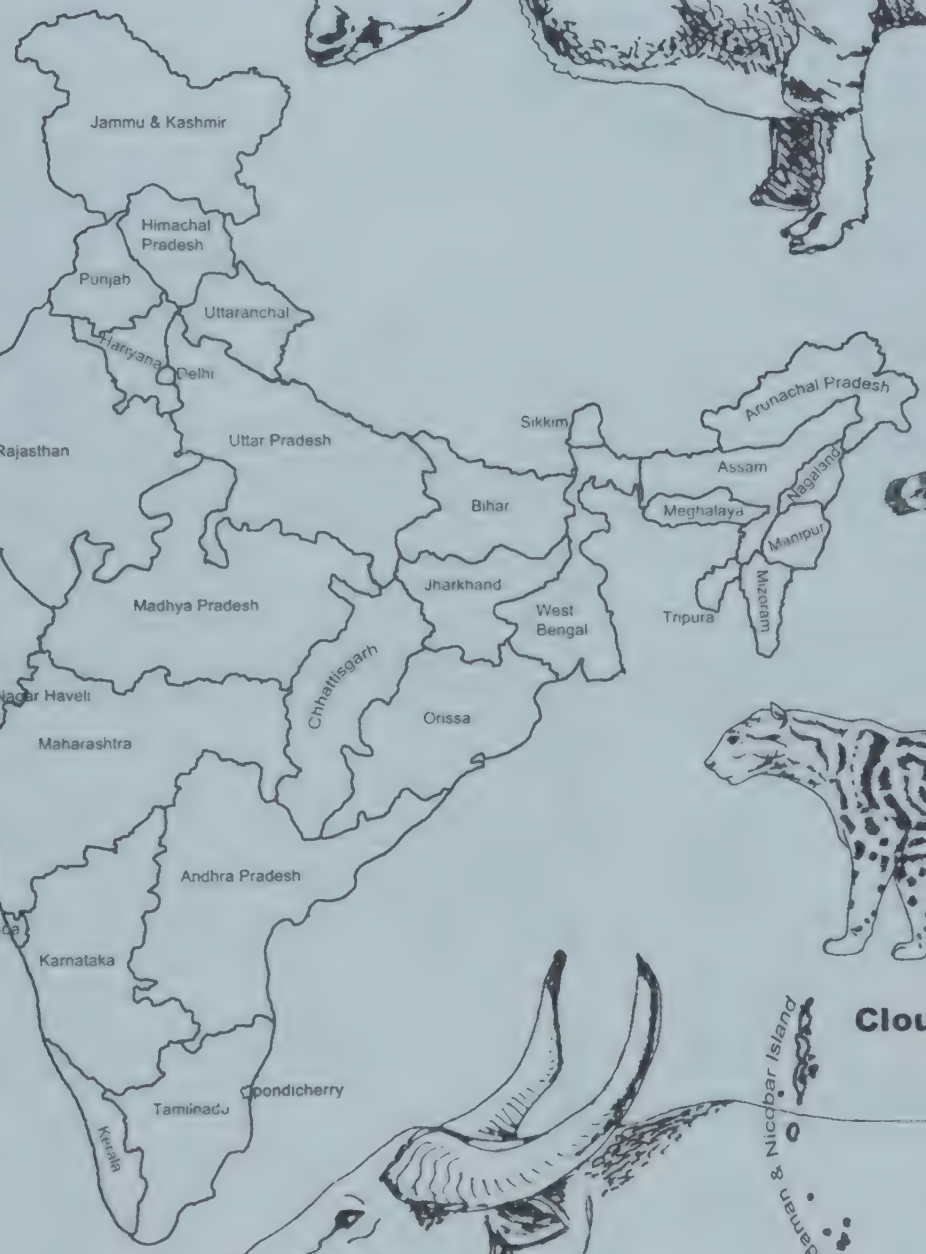


Mithun

19

Fishing Cat

8

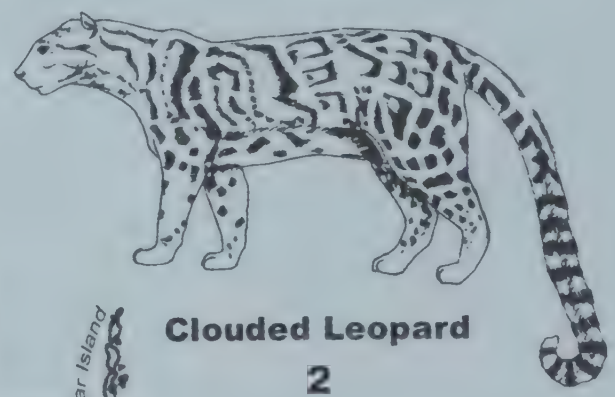


Red Panda

5

Hoolock Gibbon

4



Clouded Leopard

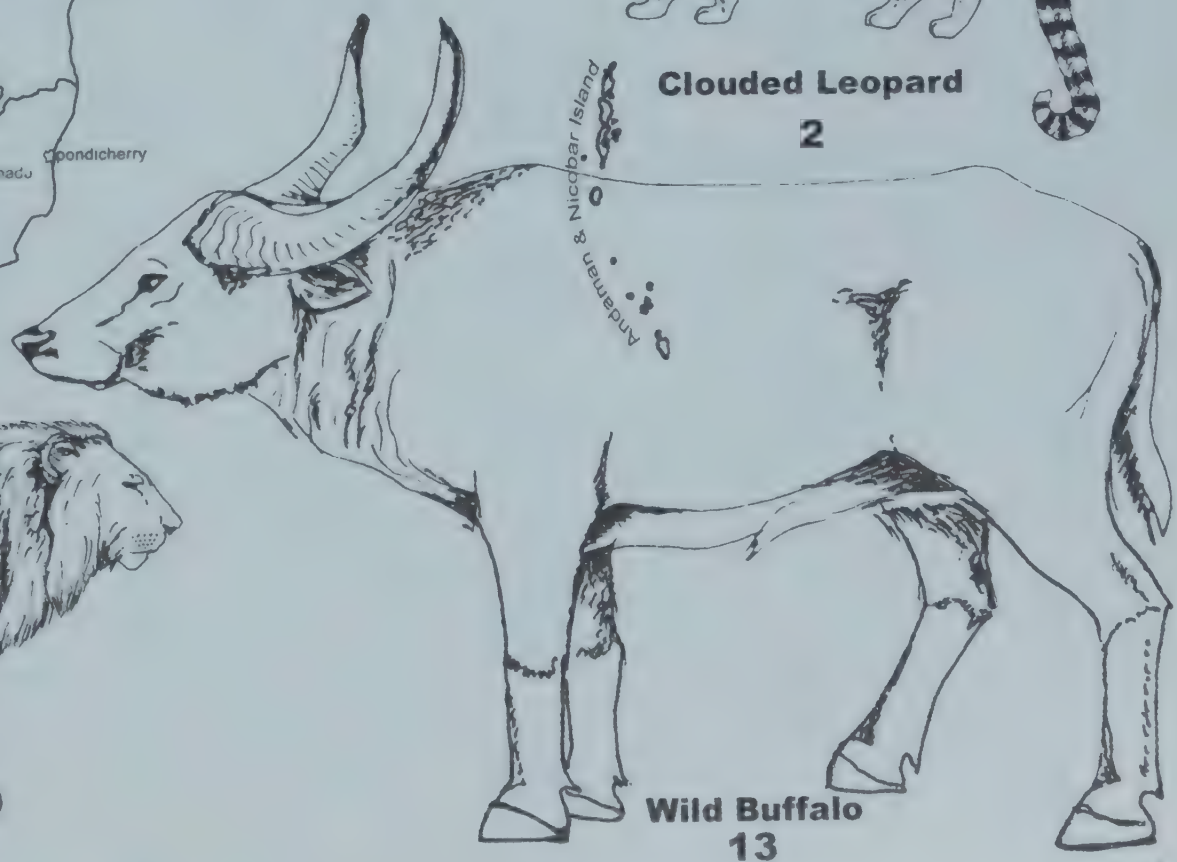
2

Butterfly Fish

12

Lion

9



Wild Buffalo

13

Activity

You will normally find langurs, chital and peacocks together in the forest. Can you guess why? Can you spot any other such relationships. One such relationship has been filled in the box for you. Make a note of your observations in the other boxes.

Forest birds form feeding parties. When fruit eating birds search for their food, they disturb insects which are eaten by the insectivorous birds. Thus moving together helps the birds get their food.

Pollination

Apart from these prey – predator linkages there are several other associations that exist in a forest ecosystem. Seeds are the basis of life in a forest. They contain all the genetic material from which new plants are produced. Most plants produce a lot of seeds but only a few grow into adult plants. A seed dropped directly under the parent plant may have difficulty in growing because the parent plant in the process of ensuring its own survival deprives the new plant of sunlight and minerals needed for growth. Several plants have developed adaptations for distributing seeds and fruits to other favorable sites.

Some plants have seeds with wings or silky growth and are dispersed by wind. A wind pollinated plant produces a very large number of seeds as the chances of seed being wasted is high. All the seeds may not fall in a place suitable for germination.

Plants growing near the water develop fruit with a spongy or fibrous coat which helps it to float and get transported by water currents.

Fruits of certain plants burst forcefully and scatter the seeds around.

Animals and birds also help in the dispersal of seeds. Squirrels and langoors feed on fruit and spread the seeds. Insects are one of the most important pollinators as a majority of flowering plants depend on them for transfer. Most flowers are brightly coloured or give off a beautiful fragrance to attract insects. During the process of collecting nectar, they transfer the pollen from one plant to another. Moths usually pollinate white flowers that can be easily seen at night. If you have been observing the forest carefully, you might have seen pollination take place!

Activity

Draw the seed of the plant and link the plant to its pollinating agent.

Seed	Plant	Pollinating Agent
	Silk Cotton Tree	Bird
	Teak	Mammals
	Orchid	Wind
	Banyan	Water
	Guava	Insect
	Coconut	Explosive mechanism

Survival

Insects use a variety of methods to ensure that they are not eaten by other predators. One of the most widely used methods is camouflage. This ensures that they look like their surroundings and thus cannot be seen by predators.

Praying mantids are superb camouflage artists. These insects can look either like a leaf, a flower, a twig or the bark of a tree. It gets its name from the way it folds its forelegs which is similar to the way we pray. The colour of the praying mantis can be either green in the rainy season or brown in the summer season.

Another insect that camouflages itself beautifully is the leaf insect, which is green in colour and looks like a leaf. If you watch carefully you will see two white spots which are its eyes

Apart from camouflage, insects also use several other modes for survival. Ants bite, bees sting, the stink bug gives off a repulsive smell, some insects spay chemicals that can irritate the skin, the blister beetle causes blisters, some insects taste awful so that birds don't eat them while others like the dung beetle play dead. A vast majority of them will simply fly away while some like the cockroach run away!

Activity

Observe the bark of trees and leaves carefully. Can you identify any camouflaged insects? Draw them or write a description of what you have seen. Remember you will see them only if you are quiet and observant.

Activity

Find me !

During your walk through the forest try and locate the different animals and plants as given in this chart. Whoever among you spots any element from the chart first, gets two points. After you have spotted it, with the help of your teacher, learn more about it and sketch it in the space given. Remember the key to winning the game is observation!

Bird	Caterpillar	Fern	Fruiting tree
Bug	Beetle	Lichen	Butterfly
Funnel web spider	Flowering tree	Black Tree Ant	Orchid
Termite mound	Insect Eggs	Praying Mantis	Fungi

Activity

Nature Envelopes

You can make nature drawings on envelopes and send them to your friends and relatives. These not only will be unique but will also help enhance their awareness about our beautiful world.

To _____
_____
_____

To _____
_____
_____

What can you do ?

Have you enjoyed walking through the forest ? Wherever you look around in a forest some activity is quietly going on. Unheard and unseen the sensitive machine of a forest is quietly functioning. It is a very complicated system in which thousands of food chains are linked to each other to form the complex forest food web. If any of the links in this chain are broken due to extinction caused by hunting or habitat loss the threads of this food web would break just as a spiders web would break if it is disturbed. The food web of the forest ecosystem is as fragile as a spiders web. If it breaks down it is impossible to repair it, as when a species becomes extinct it can never be brought back....

It is however not necessary that you will observe all these only in a forest. If you are observant enough, you will find fascinating aspects of Nature in and around your homes. Even one single tree is good enough to begin with.

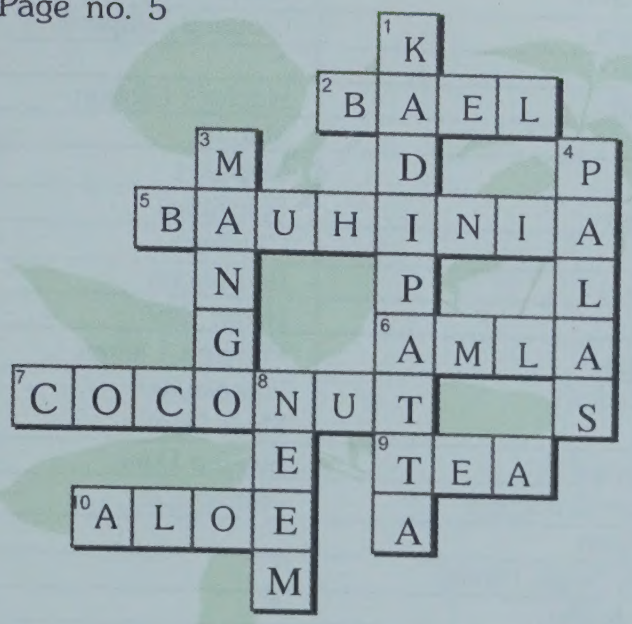
But this is not enough.

We need to preserve all these 'Wonders of Nature'. You too can do this and this is how.....

- Do you catch butterflies ? You now know that they are important pollinators of plants so that more seeds can grow into trees.
- Do you drive birds away for fun? Birds are useful not only as pollinators but because they eat a lot of insects which would otherwise become pests.
- Do you waste paper ? It is made from bamboo and wood shavings for which trees are cut. Use them carefully. Remember trees are the lungs of our earth.
- Will you tell other people about how wonderfully interesting Nature is? If you do, other people will also become concerned. Forests can then be conserved.

Answer sheet

Page no. 5



Page no. 3

Ground layer	Middle layer	Top layer
Lady Bird Beetle	Wood Spider	Golden Oriole
Termite	Bracket Fungi	Giant Squirrel
Quail	Woodpecker	Langoor
Chital	Calotes	Fire Ants
Mongoose	Vine snake	
Rat snake		
Leopards		

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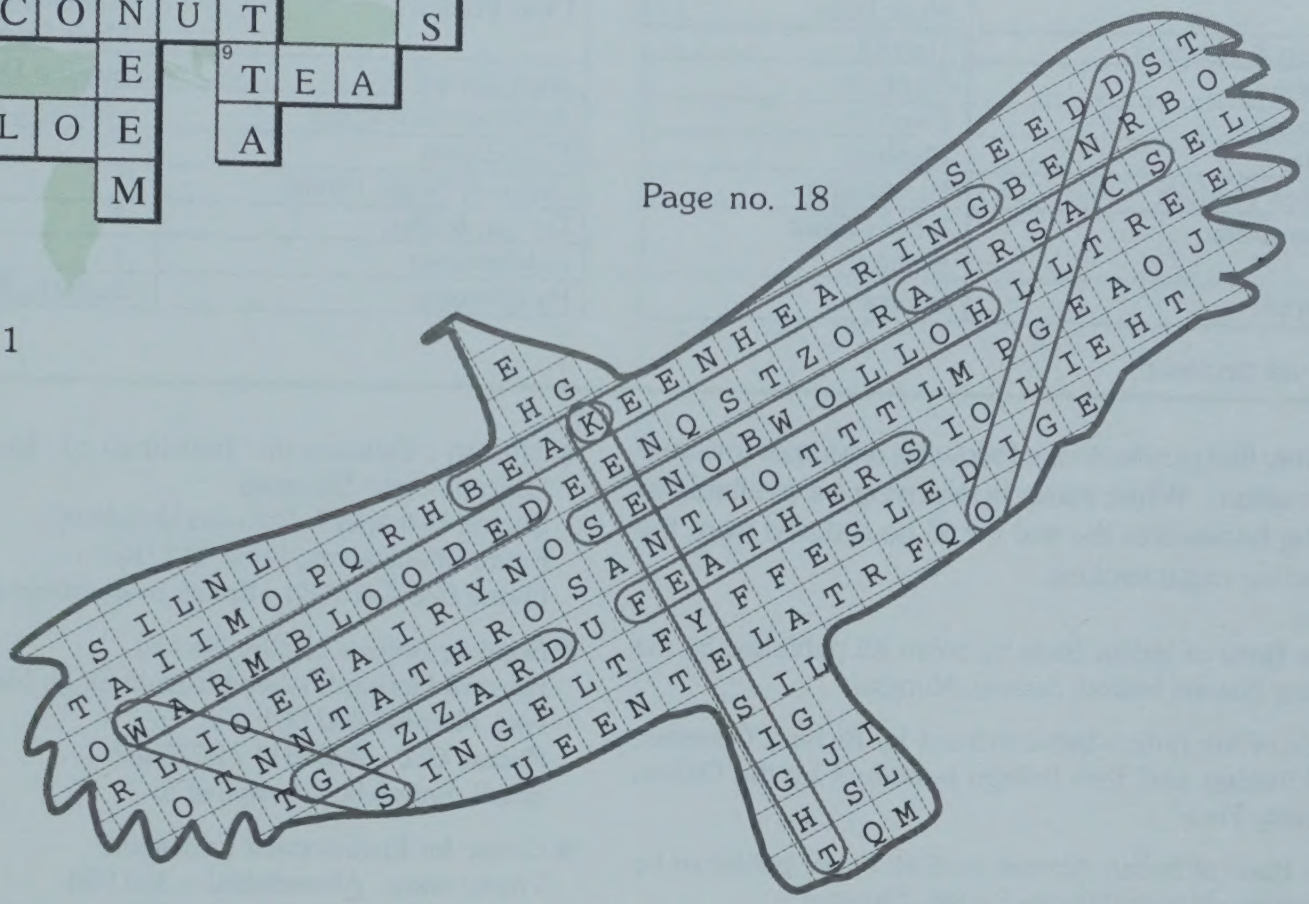

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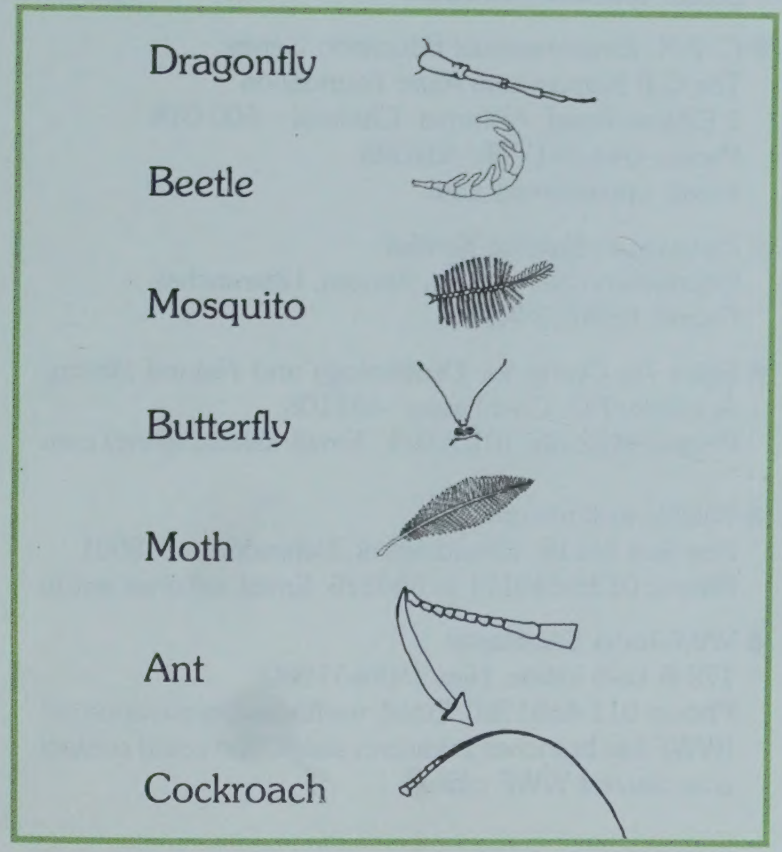
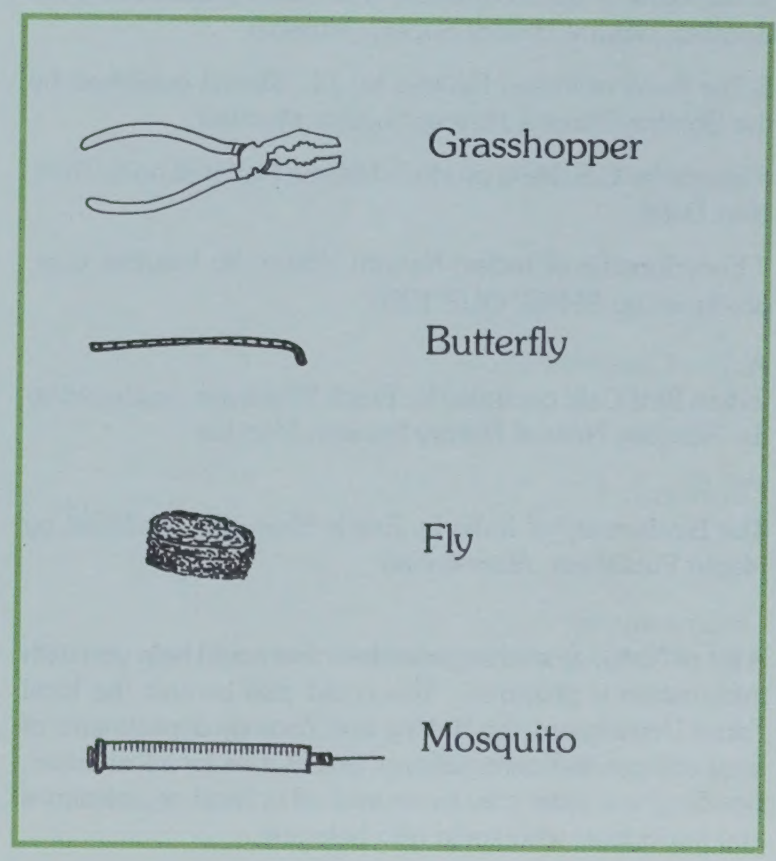
Millipede
Centipede
Spider
Crab

Page no. 16





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State name	State animal
Andhra Pradesh	Blackbuck
Arunachal Pradesh	Mithun
Assam	*
Bihar	Gaur
Chhattisgarh	Wild Buffalo
Delhi	*
Goa	Gaur
Gujarat	Lion
Haryana	Blackbuck
Himachal Pradesh	Himalayan Musk Deer
Jammu & Kashmir	Hangul
Jharkhand	Elephant
Karnataka	Elephant
Kerala	Elephant
Madhya Pradesh	Barasingha
Maharashtra	Indian Giant Squirrel
Manipur	Sangai

State name	State animal
Meghalaya	Clouded Leopard
Mizoram	*
Nagaland	Hoolock Gibbon
Orissa	Mithun
Punjab	Elephant
Rajasthan	Blackbuck
Sikkim	Chinkara
Tamilnadu	Red panda
Tripura	Nilgiri Tahr
Uttaranchal	Phayre's Langur
Uttar Pradesh	Himalayan Musk Deer
West Bengal	Swamp Deer
Andaman & Nicobar	Fishing Cat
Chandigarh	*
Dadar & Nagar Haveli	*
Daman & Diu	*
Lakshdweep	*
Pondicherry	Butterfly Fish

* not yet declared.

You may like to refer to the following resources for more information. While some books may be available at leading bookstores the rest could be ordered from the respective organizations.

Books

1. The Book of Indian Birds by Salim Ali published by the Bombay Natural History Society, Mumbai.

2.Birds of the Indian Sub-continent by Richard Grimmet, Carol Inskipp and Tom Inskipp published by the Oxford University Press

3.The Book of Indian Animals by S.H. Prater published by the Bombay Natural History Society, Mumbai

4.The Book of Indian Trees by K.C. Sahni published by the Bombay Natural History Society, Mumbai

5.The Book of Indian Reptiles by J.C. Daniel published by the Bombay Natural History Society, Mumbai

6.Insects by C.S. Mani produced by the National book Trust, New Delhi

7.Encyclopedia of Indian Natural History by Haukim (Ed), produced by BHNS/ OUP 1986

Audio-Cassettes

Indian Bird Calls compiled by Erach Bharucha produced by the Bombay Natural History Society, Mumbai

CD-Roms

The Biodiversity of India by Erach Bharucha produced by Mapin Publishers, Ahemdabad

Organisations

A list of National level organizations that could help you with information is provided. You could also contact the local Forest Department, the Botany and Zoology departments of local colleges and universities as well as zoos for information. Besides these there may be several other local organizations and individuals who could also help you.

- Bharati Vidyapeeth Institute of Environment Education and Research
  Bharati Vidyapeeth Deemed University
  Katraj-Dhankawadi, Pune 411 043
  Phone 020-4375684 Email: bvieer@vsnl.com

- Bombay Natural History Society
  Hornbill House, Shaheed Bhagat Singh Marg
  Fort, Mumbai 400 001
  Phone: 022 – 2821811 / 2025481
  Email: bnhs@bom4.vsnl.net.in

- Centre for Environment Education
  Thaltej tekra, Ahmedabad – 380 054
  Phone: 079-6858002 / 6858003
  Email: ceeindia@vsnl.com

- C. P. R. Environmental Education Centre
  The C.P. Ramaswami Aiyar Foundation
  1 Eldams Road, Alwarpet, Chennai – 600 018
  Phone: 044-341778 / 436526
  Email: cpreec@vsnl.com

- Paryavaran Shiksha Kendra
  Uttarakhand Seva Nidhi, Almora, Uttaranchal
  Phone: 05962-34430

- Salim Ali Centre for Ornithology and Natural History
  Anaikatty P.O. Coimbatore -641108
  Phone: 0422-857101/2//3/4 Email: salimali@vsnl.com

- Wildlife Institute of India
  Post Box No.18, Chnadrabani, Dehradun – 248001
  Phone: 0135-640111 to 640115 Email: wii@wii.gov.in

- WWF-India Secretariat
  172-B Lodi Estate, New Delhi-110003
  Phone: 011-4691760 Email: wwfindia@crosswinds.net
  (WWF has branches in various states. You could contact your nearest WWF office.)

The Bharati Vidyapeeth is an educational institution that has over a hundred teaching institutions spread over Western Maharashtra in both urban and rural areas. The Bharati Vidyapeeth Institute of Environment Education and Research (BVIEER) established on 25th January 1994 is a part of the Bharati Vidyapeeth Deemed University, Pune.

The programs of the Institute include formal environment education, non-formal educational activities and research. These independent spheres of activities have been integrated to augment the effectiveness of all three components. In the formal sector the Institute conducts a Doctoral program, a Masters program and an undergraduate program in Environment Science as well as a Diploma in Environment Education specially designed for inservice school teachers and individuals working with Government or Non-Government organizations who deal with environmental issues. The Institute has a major non-formal environment education outreach initiative which includes conducting training workshops for teachers in environment education, organizing school environment education programs through trained teachers and developing locale specific environment education material. The Institute also houses an Environment Museum and Activity Centre, which is used by teachers and students as a teaching-learning resource. The research done at the Institute focuses on need based issues with a view to bring about proconservation action. A major focus is on biodiversity conservation and environment education

The India-Canada Environment Facility (ICEF) was established in 1993 following the signing of a Memorandum of Understanding (MOU) between the Government of India and the Government of Canada in 1992.

It is a joint project of the two Governments for the purpose of undertaking environmental projects in the water and energy sectors. ICEF operates as a registered society under the Indian Societies registration Act 1860. It is jointly managed by representatives from the Governments of India and Canada. The partnership works directly with Indian institutions and organisations to enhance and promote environmentally sound development, with a principal focus on building and sustaining institutional capacity and related management capability in natural resource and environmental management. The objectives of ICEF are institutional development, conservation and restoration, policy and national dialogue and technology adoption.

The World Wide Fund for Nature-India (WWF-India) formerly known as the World Wildlife Fund-India was established in 1969 as a Charitable trust under the Bombay Public trusts Act 1950.

Today WWF-India is the country's largest conservation NGO with a network of State/ Divisional and Field Offices spread across the country with its Secretariat located in New Delhi. WWF's mission is 'The promotion of nature conservation and environmental protection as the basis for sustainable and equitable development'. In achieving its mission WWF uses field programs that serve as demonstration projects, public policy analysis and debates through independent research, consultation, campaigns, education activities for key target groups including the youth, professionals and administrators, networking and supporting the work of fellow NGOs in India and mobilizing necessary financial, scientific and technical resources.

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